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Mental Improvement:

OR THE

BEAUTIES AND WONDERS

OF

NATURE AND ART.

IN A SERIES OF

INSTRUCTIVE CONVERSATIONS.

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BY

PRISCILLA WAKEFIELD,

AUTHOR OF LEISURE HOURS.

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VOL. II.

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L O N D O N:

PRINTED AND SOLD BY DARTON AND HARVEY,

NO. 55, GRACECHURCH-STREET.

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# MENTAL IMPROVEMENT;

IN A SERIES OF

INSTRUCTIVE CONVERSATIONS.

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## CONVERSATION XI.

MRS. HARCOURT.

AS the woollen manufacture seemed to afford us great entertainment the last time we met, may we not be amused with the particulars of the linen and cotton manufactures in their various branches? Sophia has made herself acquainted with the natural definitions of both flax and hemp, with the design of contributing materials for our conversation.

VOL. II.

B

MR.

## MR. HARCOURT.

We cannot adopt a more suitable subject; the one leads the way to the other. In the early savage state, when men united in small societies, for the sake of protection and defence, we find they clothed themselves with the skins of beasts in their rough natural state, unimproved by any art or dressing, merely for the purposes of decency and warmth. In cold climates, the savage tribes frequently wear the hair inwards. As they advance to a higher state of civilization, they make use of materials that admit of greater skill in preparing, and study ornament as well as use. Captain Cook relates, that the inhabitants of some places he visited have a method of weaving cloth of a certain species of grass. The natives of Atooi make cloaks and caps of feathers, with great ingenuity, on which they set a high value, and which appear appropriated to the chiefs, and great men of the country. Many of the islands

in

in the South-Sea are so far advanced towards civilized life, as to have an established manufacture of cloth, which is made by the women. They take the stalks or trunks of the paper-mulberry, which rarely grows more than seven feet in height, and about the thickness of four fingers. From these stalks they strip the bark, and scrape off the exterior rind; after which the bark is rolled up, and softened for some time in water; it is then beaten with a square instrument of wood, full of coarse grooves, but sometimes with a plain one. When sufficiently beaten, it is spread out to dry; the piece being from four to six or seven feet in length, and about half as broad. These pieces are joined by smearing part of them with the glutinous juice of a berry, called Tooo; and, after being thus lengthened, they are placed over a large piece of wood, with a sort of stamp, composed of a fibrous substance laid beneath them. The manufacturers then take



a bit of cloth, and having dipped it in a juice expressed from the bark of a tree, called kokka, rub it briskly over the piece that is making. This leaves a dry gloss, and a dull brown colour upon the surface, and the stamp makes, at the same time, a slight impression, which finishes the work. But when we compare these simple works with the variety, elegance, and utility of the manufactures of the polished nations of Europe and Asia, the degrees of refinement and civilization are clearly marked; and we are enabled to form distinct ideas of the difference between the rude productions of the untutored mind, and those which are the result of science and art; but I am wandering from our subject. Sophia, your young friends wait impatiently to hear your account of flax and hemp, which form the materials of the linen of this country, from the coarsest cloth, to the finest lace.

SOPHIA.



## SOPHIA.

Flax is a genus of the petandria, pentagynia class. The flower has a permanent empalement, composed of five small spear-shaped acute leaves, and five large oblong petals, and five awl-shaped erect stamina, terminated by arrow-shaped summits. In the centre is situated an oval germen, supporting five slender styles, crowned by reflex stigmas, which turn to a globular capsule with ten cells, opening with five valves, in each cell is lodged one oval, smooth seed, with an acute point. There are fourteen species. The common flax is an annual plant, that will grow in any kind of good sound land. The best land yields the best flax.

## CHARLES.

As the tilling and ordering of flax is so profitable to the farmer, I regret it is not more frequently cultivated.

## MR. HARCOURT.

Since you seem to be acquainted with

the management of it: pray tell us the seasons for sowing and gathering it.

CHARLES.

The time of sowing is the latter end of March. The best way of sowing flax-seed is to drill it in equidistant rows, about ten inches from one another. Towards the end of August the flax will begin to ripen, and must be pulled, as soon as the seed grows brown, and bends down the heads.

MR. HARCOURT.

Riga supplies us with the best seed. Scotland and Ireland import great quantities from thence annually. Flax and hemp have the remarkable property of communicating a poisonous quality to water, when laid in it for the purpose of decaying the stem, and procuring the bark for mechanical purposes, so that cattle die that drink of it.

AUGUSTA.

I am quite unacquainted with the manner of making linen from a plant. Mr.

Harcourt

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Harcourt said just now, that hemp and flax formed the materials of linen. I thought linen had been made of thread.

CECILIA.

So it is; but all the various sorts of thread we use are made of flax.

MRS. HARCOURT.

Hemp is very similar to flax in its culture and use, therefore one description of the manner of preparing them will be sufficient for both. When they gather it, they pull it up by the roots, after which they bind it up in bundles. They comb out the heads on the teeth of a ripple, which pulls off the leaves, the husks of the seeds, and the seeds themselves together. These are gathered in a heap, and left in that condition for a few days, in order to heat a little, after which they are spread out to dry, before they are threshed, and the seeds are separated by winnowing and sifting. Then, in order to rot the bark, they are laid in water, that it may be more easily separated

rated from the reed. When it is sufficiently rotted, the stalks are dried in an oven or kiln. The next thing to be done is peeling off the bark, which is performed by various means, but it is most expeditiously effected by mills.

HENRY.

Do not people beat hemp in Bridewell?

MR. HARCOURT.

The beating hemp with beetles is a very laborious employment, and is used as a punishment for the idle and dissolute, who are confined there for small crimes.

MRS. HARCOURT.

In order to complete the process, they beat it till it is soft and pliable, and, after washing and bleaching it, it is heckled with instruments resembling a wool-dresser's comb, to disentangle the shorter tow from the longer, which is then fit to be spun into thread for the different purposes of weaving, &c,

AUGUSTA.

## AUGUSTA.

I am ashamed of my ignorance; but it is wonderful to me, to think that this piece of linen ever grew in a field.

## MR. HARCOURT.

It is said that the first step to knowledge, is a consciousness of ignorance. Endeavour, children, to increase your stock of useful knowledge daily, by attention to every thing you see and hear. There are various kinds of linen, the principal materials of which are flax, cotton, and hemp. The linen trade of Europe is chiefly in the hands of the Russians, Germans, Flemings, Hollanders, French, and Irish. Cotton is a woolly or downy substance, which incloses the seed, and is contained in a brown husk or seed vessel of a certain plant, that grows both in the East and West Indies. There are several species of this plant cultivated in different places. Cotton forms a very considerable article of commerce; it is distinguished into two sorts, cotton in the



the wool, and spun cotton. The first is quilted between two stuffs, and is made use of for the purpose of rendering them thick and warm, as for coverlids for beds, petticoats, &c. but the latter kind is of most general use, as when spun and woven, it makes calicoes, cloths, muslins, dimities, besides a kind of quilting, ingeniously contrived to resemble that done with a needle. It is also frequently intermixed with silk or flax in the composition of various kinds of stuffs. Manchester, which has long been celebrated for various branches of the linen, silk, and cotton manufacture, is now conspicuous as the centre of the cotton-trade.

### CHARLES.

Cotton anciently grew only in Egypt; and was confined to the use of the priests and sacrificers, for a singular kind of gown, worn by them alone.

### MRS. HARCOURT.

Although hemp does not form a material

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terial for works of so delicate a texture as flax and cotton, it deserves to be noticed for the many useful properties it contains. Of what use would our ships be, without ropes and sails? Sophia, you have performed but half your promise; I call upon you now to fulfil the other part of your engagement.

SOPHIA.

I am always ready to obey you. Hemp is a species of the dioecia pentandria class. It is male and female in different plants. The male flowers have a five leaved concave empalement, without petals, but have five short hairy stamina, terminated by oblong square summits. The female flowers have permanent empalements of one leaf, without petals, but a small germen, which afterwards becomes a globular depressed seed, inclosed in the empalement. We have but one species of this plant, which is propagated in the rich fenny parts of Lincolnshire, in great quantities for its bark,

bark, which is useful for cordage, cloth, &c.

CECILIA.

Oh, I remember, my uncle shewed me some, when I was on a visit at his house. It rises quick into a tall slender shrub, its stem is hollow, and he told me, was frequently made into charcoal, and is used in that form in the composition of gunpowder. Its leaves arise from the same pedicle, and are a little jagged, yielding a strong smell, apt to make one's head ach. The flowers grow in clusters, and the bark is a tissue of fibres, joined together by a soft matter, which easily rots away.

MR. HARCOURT.

It does not appear that the ancients were acquainted with the use of hemp, with respect to the thread that it affords. The moderns are not contented with that production only, but torture this poor plant, for another valuable commodity that it contains; Henry can tell us what that is.

HENRY.

## HENRY.

Oil. I have not forgotten what I saw at the mill. They bruise the seed of flax, which is called linseed, as well as hempseed, with vast hammers, which are too heavy for men to lift; and are set a going with wheels, which are turned by the stream of a river.

## MR. HARCOURT.

You shew a good memory. This oil has most of the qualities of the nut-oil, and is used as a substitute for it in painting. The oil drawn without the assistance of fire, is much esteemed in medicine, especially in the cure of catarrhs, coughs, asthmas, &c. After the oil is squeezed from the seeds, the seeds are heated over the fire, and being put into woollen bags, are pressed into pieces about twelve inches long, and six inches wide, called oil-cakes, and used to fatten cattle. These cakes beaten again to dust, become an excellent manure for land. Thus ingenuity

and industry have applied almost every part of this plant to a valuable purpose.

CHARLES.

There is still one kind of linen cloth that we have not mentioned, and which I think more curious and extraordinary than any that has been described. If Augusta is surprised that linen should be spun from the fibres of plants, how much more astonished will she be, to find that cloth has been made of stone?

AUGUSTA.

I am less inclined to disbelieve things that I do not understand than I was, when your kind mother permitted me to join in these instructive conversations; since I have heard many things equally new and wonderful to me, who had never been taught to observe or reflect upon the objects that fell in my way; but this time, Charles, I am really incredulous, and think you say this only to banter me.

CHARLES.



CHARLES.

Nothing is more certain. I have seen and handled specimens of it; and to increase the wonder of my tale, this cloth will not consume in the fiercest fire.

CECILIA.

Pray, Charles, explain it. This is an enigma that we cannot guess.

CHARLES.

There is a mineral substance, called asbestos, of a whitish or silver colour, and a woolly texture, consisting of small threads or fibres, endued with the wonderful property of resisting fire, and remaining unconsumed in the intensest heat. A method has been found of working these fibres into cloth and paper. This kind of linen was much esteemed by the ancients, being held equally precious with the richest pearls. Pliny says, he had seen napkins made of it, which, when taken soiled from the table at a feast, were thrown into the fire, and were better scoured in that man-

ner, than they could have been, if they had been washed in water; but the purpose, for which it was so highly valued, was the making of shrouds for royal funerals, to wrap up the corpse, so that the ashes of the deceased might be preserved distinct from those of the wood, &c. of which the funeral pile was composed. They also made the wicks of their perpetual lamps of the same material.

### CECILIA.

Did not the ancients bury their dead in the same manner we do?

### MR. HARCOURT.

Different nations and ages have had various modes of disposing of their deceased friends and relations. The ancient Romans carried the body borne on a bed or litter, covered with purple, and followed by the kindred of the deceased, to the rostra; and if he had been a person of great quality, attended by old women, called *præfica*, singing songs in his praise; and the

the funeral was preceded by waxen images of all his predecessors borne on poles. When arrived there, the nearest of kin pronounced an oration extolling his virtues and those of his ancestors; after which they proceeded to the funeral pile, where upon they laid the body, and set fire to the whole. The ashes were then carefully gathered up, and inclosed in an urn, which was placed in the sepulchre or tomb. The ceremonies of the Egyptians were very peculiar. They embalmed the body with aromatic spices and perfumes, in order to preserve it from decay; and it is supposed that the pyramids, so wonderful for their antiquity and magnitude, were erected as monuments or tombs to contain the bodies of their departed kings.

MRS. HARCOURT.

One of their customs pleases me much, as I think it was calculated to restrain vice, and encourage virtue. They brought their kings to a form of trial after their death:

those who were convicted of having oppressed their people, and leading bad lives, were deprived of the honours of burial, and their memories held in detestation; but every respect was paid to those who had passed their lives in a virtuous manner; and even durable monuments erected to perpetuate their names, and transmit the recollection of their example to the latest posterity. To-morrow evening we shall select the silk manufacture as a subject, well suited to follow those of wool and linen, and forming a proper sequel to them. At present I find myself a little indisposed, and wish to retire early. Adieu, my dear children, easy dreams, and a good night to you.

CONVER.

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## CONVERSATION X.

MRS. HARCOURT.

**A**CCORDING to our agreement yesterday, we shall pursue the manufacture of silk through its various operations this evening; but as many of these are very similar to the same processes, in those of flax and hemp, we shall only just mention them, and dwell more on the manners and metamorphoses of this minute labourer, whose skill supplies the finest palaces with their richest furniture, and without whose aid the habits of queens and princesses would be coarse and mean.

MR. HARCOURT.

Wool and flax are extremely valuable for their use, and are no more to be contemned in comparing them with silk, than iron is to be undervalued in comparison with



with gold and silver. The coarser metal, like the coarser materials for cloth or stuff, is far more necessary for our accommodation, though less brilliant and inferior for the purposes of ornament and splendor, than the more beautiful productions of the mine, or the silk-worm. Diamonds are dazzling to the eyes of the superficial observer, but was their real value subtracted from the adventitious price, that refinement and luxury have raised them to, we, like the cock in the fable, should prefer something more useful, and less shining.

CHARLES.

I cannot help remarking, how sparing nature has been in those productions that are not of essential use, though highly prized, and sought with such great avidity by the avarice of man.

MR. HARCOURT.

Nature, wise in all her ways, has bestowed the most useful things in the greatest abundance: and in many instances, has rendered

rendered those objects, which we are apt to despise for their minuteness, and apparent insignificancy; or because they are so common, that they do not call forth our attention, the most necessary to our subsistence and convenience.

MRS. HARCOURT.

The ancients were but little acquainted with the use and manufacture of the very soft, fine, bright, delicate thread, produced by the silk-worm. It was a very scarce commodity among them for many ages. The art of manufacturing it, was first invented in the isle of Cos: and Pamphila, daughter of Platis, is honoured as the inventress.

CHARLES.

It was not long unknown to the Romans, although it was so rare, that it was even sold weight for weight with gold. And I have read that the emperor Aurelian, who died in the year 275, refused the empress, his wife, a suit of silk, which she solicited

solicited of him with much earnestness, merely on account of its dearness. Helio-  
 gabalus, the emperor, who died about  
 half a century before Aurelian, is said to be  
 the first person who wore a holosericum, or  
 garment all of silk.

### MR. HARCOURT.

The Greeks of Alexander the Great's  
 army, are supposed to have brought wrought  
 silk first from Persia, into Greece, about  
 three hundred and twenty-three years be-  
 fore Christ. But the manufacture of it  
 was confined to Phœnicia, from whence it  
 was dispersed over the West. Two monks,  
 coming from the Indies to Constantinople,  
 in 555, under the patronage of the Emperor  
 Justinian, brought with them great quan-  
 tities of silk-worms; with instructions for  
 the hatching their eggs, rearing and feed-  
 ing the worms, and spinning and work-  
 ing the silk; which was the means of estab-  
 lishing manufactures at Athens, Thebes,  
 and Corinth. The Venetians, soon after  
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this time, commencing a commerce with the Greek empire, supplied all the western part of Europe with silks for many centuries. But various improvements have been made in the art since that time; such as damasks, velvets, &c. The rest of Italy and Spain, by degrees, learned this art, from some manufactories established by Roger the Second, King of Sicily, about 1150, in different parts of his dominions. And a little before the reign of Francis the First, the French became masters of it.

#### SOPHIA.

There was a company of silk-women in England so early as the year 1455.

#### MRS. HARCOURT.

It is most probable that they were only employed in needle-work of silk and thread; for Italy supplied England with the broad manufacture, the chief part of the fifteenth century.

Mr.

## MR. HARCOURT.

Silk remained a rarity a long time in France. Their king, Henry the Second, is supposed to have worn the first pair of knit silk-stockings. After the civil wars, the plantations of mulberry-trees were greatly encouraged by Henry the Fourth, surnamed the Great, on account of the love he shewed his people, and the true patriotism he displayed during his troublesome reign. His successors continued to patronize the culture of these trees, and the produce of silk is at this day very considerable in that country. King James the First was very earnest to introduce it into England, but unhappily without effect. Although we have hitherto failed in rearing the worms, and raising raw silk of our own, the broad silk manufacture was introduced among us as early as the year 1620, and pursued with great vigour and advantage.

MRS.



## MRS. HARCOURT.

Greatly were we indebted to the tyranny and intolerance of our neighbours, the French, who by the revocation of the edict of Nantes, in 1685, which means the repealing a law made in favour of Protestants, drove vast numbers of their most skilful workmen in this branch to take shelter in our land of liberty; they were kindly received, and settled in Spital-Fields, where they have carried on an ingenious and flourishing manufacture, till within these few years, that the British ladies have exchanged the wear of silk, for that of calicoes and muslins, by which transition these poor manufacturers are reduced to a very distressed situation; being without employment, and in want of most of the necessaries of life. It is an object worthy the consideration of persons of ability, to suggest some plan for turning the industry of so many hands into a different channel, and rendering them capable of maintaining their families, and be-

coming again useful to society. The silk-worm is an insect, not more remarkable for the precious matter it furnishes, than for the many forms it assumes. Cecilia, who keeps many of them, will amuse us with an account of these metamorphoses.

### CECILIA.

From an egg, about the size of a pin's head, it becomes a small black worm, which daily increases till it is as large as a common caterpillar; during its worm state it frequently changes its skin, and becomes by degrees of a light ash colour, inclined to yellow, and almost transparent, when about to spin. Henry brings me fresh mulberry leaves every morning to feed them with. When come to maturity, the silk-worm winds itself up in a silken bag or case, about the size and shape of a pigeon's egg; it forms this ball, by moving its mouth backwards and forwards, chusing some corner to begin its work in, and fastening its silk with a kind of natural gum to the sides,  
till

till it has entirely inclosed itself; always working from one single end, which it never breaks, unless disturbed; and it is so fine, and so long, that I have read, that those who have examined it attentively, think they speak within compass, when they affirm, that each ball contains silk enough to reach the length of six English miles. On opening this curious web, one is surprised to find a chrysalis or aurelia, instead of a silk-worm which is brown, and about the size of a bean. In this state it remains for some time apparently without life or motion; till at length out creeps a whitish moth, leaving the husk or outer skin of the chrysalis behind it. This is the last form it assumes; for, after having laid a multitude of eggs, it dies, and leaves them to be hatched by the warmth of the succeeding spring.

MRS. HARCOURT.

When the worm is supposed to have finished its work, which is generally in

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about ten days: the people who are employed in the care of these insects, for the sake of profit, collect the golden balls from off the mulberry trees, to the leaves of which they glue their silk, and putting a handful of them into a copper of warm water, of a proper temperature to dissolve the gum, and occasion the silk to wind off more readily, having first pulled off a woolly coarse kind of silk, which covers the balls. They take the ends of twelve or fourteen cones at a time, and wind them off into skeins. In order to prepare this beautiful material for the hand of the weaver, to be wrought into silks, stuffs, brocades, sattins, velvets, ribbons, gauzes, &c. it is spun, reeled, milled, bleached, and dyed in a manner so similar to other materials, as to render a particular description unnecessary.

MR. HARCOURT.

There is a kind of silk, that we must not omit mentioning, which comes from the  
East.

East-Indies, and is not the work of the silk-worm, but comes from a plant, that produces it in pods, much like those of the cotton-tree. The matter this pod contains is extremely white, fine, and moderately glossy. It spins easily, and is used in several manufactures of Indian and Chinese stuffs.

SOPHIA.

I think I have heard of silk being spun from cobwebs.

AUGUSTA.

Surely that would be impossible, the threads are so fine and slender; besides, who would be willing to breed and tend spiders. I am terrified at the sight of one. How frightful would it be to enter a room where thousands were confined! I shudder at the thought.

MRS. HARCOURT.

Had you not unfortunately been brought up with this prejudice, you would have had no more fear of a spider, than any other



insect. In this country they are harmless, and have far more reason to dread us, than we have to be apprehensive of them. Use your reason, overcome such groundless fears; with men of sense, they lay our sex under the imputation of affectation or ignorance, and savour strongly of vulgarity, and want of education. When you have attentively considered the curious structure of this insect, and how wonderfully every part is adapted to its intended purpose, I believe you will be more inclined to look at it, in future, with an eye of admiration than terror.

MR. HARCOURT.

The secret has been discovered in France, within a few years, of procuring and preparing silk from spider's webs, and the using it in several manufactures has been attempted. Spiders are distinguished by naturalists into several kinds, according to the construction of their parts; but with regard to the silk-spiders, they are reduced

reduced to two kinds, those with long legs, and those with short, which last furnish the finest raw silk. The silk it makes is nearly as beautiful, glossy, and strong, as that of the silk-worm; the silk proceeds from five papilla or nipples, placed under the belly, towards the end of the tail. These serve as so many wire drawing irons to form and mould a viscous liquor, which when dried in the air, as it is drawn through them, forms the silk. The threads are of two kinds; the first is weak, and only serves for that kind of web, with which they catch flies. The second is much stronger, and is applied to wrap up their eggs in, which by means of this inclosure, are sheltered from the cold, and the depredations of other insects. They wind these threads very loosely round the eggs, resembling the balls or bags of silk-worms, that have been prepared and loosened for the distaff. After having gathered twelve or thirteen ounces of these bags,

M. Bon,

M. Bon, the person who made these experiments, had them well beaten for some time, to get out all the dust; he then washed them in lukewarm water; after this he steeped them in a large vessel, with soap, salt-petre, and gum arabic; when he boiled the whole, for three hours, over a gentle fire; the soap was then washed out of them, and the bags dried, to fit them for carding. Stockings and gloves were made of it, and presented to the Academy in Paris, as well as to our Royal Society in London. The great difficulty that remains to be surmounted, is the art of breeding and confining these voracious insects in a room together, as the natural fierceness of spiders renders them incapable of living in community. Four or five thousand, being distributed into cells, the large ones soon killed and devoured the smaller, so that, in a short time, there was left scarcely more than one or two in a cell: and to this apparent unnatural propensity of eating one another,

another, the scarcity of spiders is attributed, considering the vast number of eggs they lay. Every spider lays six or seven hundred. The young ones live ten or twelve months without eating, and continue in their bags without growing, till the warmth of the returning summer, putting their viscid juices in motion, induces them to come forth, spin, and run about in search of food. But I believe Sophia is better qualified to give us a lecture on the construction and manners of this extraordinary little creature.

### SOPHIA.

With peculiar pleasure I shall relate what particulars I am acquainted with, as I am convinced, no one, who has examined its parts with a microscope, can behold it again as an object of abhorrence. Spider, a genus of the aptera order of insects; Linnaeus enumerates forty-seven species. This insect affords, to the sagacious observer, a great many curious particulars. As the  
fly

fly (which is the spider's natural prey) is an animal extremely cautious and nimble, and usually comes from above, it was necessary the spider should be furnished with a quick sight, and an ability of looking upwards, forwards, and sideways at the same time; and the microscope shews that the number, structure, and disposition of its eyes are wonderfully adapted to the serving all these purposes. Most spiders have eight eyes, two on the top of the head or body; for there is no division between them, the spider having no neck. These look directly upwards. There are two more in front, placed a little below these, and discovering all that passes forwards: and on each side, a couple more, one of which points sideways forwards, the other sideways backwards, so that it can see almost quite round. Whatever be the number of the spider's eyes, for there are not the same number in all the different species, they



they are, however, always immoveable and transparent, and are situated in a most curious manner. All spiders have eight legs, which they employ in walking, and two shorter ones, called arms, used in seizing their prey. All the legs are thickly beset with hairs, each has six joints, and ends with two hooked claws, which are jagged on the inside. By means of this sort of teeth in the claws, they seize very fast hold of their prey; besides these weapons of attack, nature has furnished this creature with a pair of sharp-crooked claws, or forceps in the forepart of its head. These are placed horizontally or crosswise, and when not exerted for use, are concealed in two cases, contrived for their reception, in which they fold like a clasp-knife, and there lie between two rows of teeth, which are likewise employed to hold fast the prey, so that a poor fly has not the least chance of escaping the jaws of such a well-armed formidable enemy.

HENRY.

HENRY.

Pray, mamma, lend me your microscope, that I may examine every spider I find.

MRS. HARCOURT.

You are welcome to the use of it, provided you are careful not to break it. Mr. Lewenhoeck, who has made microscopic objects his peculiar study, has computed, that one hundred of the single threads, of a full grown spider, are not equal to the diameter of the hair of his beard; and consequently, if the threads and hair be both round, ten thousand such threads are not bigger than such a hair. He calculates that when young spiders first begin to spin, four hundred of their threads are not larger than one, which is of a full growth. Allowing this to be fairly stated, four millions of a young spiders threads, are not so big as the single hair of a man's beard.

AUGUSTA.

## AUGUSTA.

Astonishing minuteness! Since you say it is ridiculous, I will endeavour to overcome my aversion to spiders.

MRS. HARCOURT.

We are going from home for a few weeks; by the time we meet again, I flatter myself you will have availed yourself of my advice on many subjects; and that I shall find you improved by the exertion of your reason, in the correction of any foibles you may have. Your young friends will think the separation tedious, but you will enjoy each other's company the more for this little interruption. Adieu, my dear child, may you enjoy health and happiness till our next meeting.

## CONVERSATION XIII.

MRS. HARCOURT.

**I** PARTICIPATE the general pleasure at being again assembled, after so long an absence, to renew those pleasing and instructive conversations, in which we have passed so many agreeable evenings. During our separation our time has not been spent idly; we have attentively examined the different objects we have met with on our journey; and each one of us has collected observations on some particular subject, in order to furnish materials for new entertainment. My dear Augusta, how have you amused yourself since we have been absent? have you added to your stock of knowledge by fresh acquisitions; or have you employed your time in perfecting yourself in those branches of science already begun?

AUGUSTA.

## AUGUSTA.

No one has so much reason to rejoice at your return, my dear Mrs. Harcourt, as myself. I have indeed deeply lamented your absence; for without a guide, or a companion, what pleasure is there in pursuing improvement? Summer is a season that tempts one abroad. I have walked a great deal, and in some of my rambles have availed myself of your directions, to become acquainted with the nature of plants and flowers. I have learned the names of the different parts that compose them; and, if Sophia will give me her kind assistance, I hope in time to become a botanist.

## SOPHIA.

You cannot propose any thing more agreeable to me, than that we should pursue this delightful study together. Our walks will become more interesting, by having a particular object in view; every step we advance will supply new entertainment; from the humble moss, that creeps upon



the thatch, to the stately oak, that adorns the forest.

CHARLES.

Gently, Sophia; you must not intrude upon the subject I have chosen. The humble moss, and its diminutive companions, I willingly relinquish to your claims; but the stately oak, and its attendant forest trees I have selected, as suitable to amuse this company with; and though I readily resign any thing to you that merely concerns myself, I cannot give up the only theme that I am prepared to speak upon.

SOPHIA.

Lay aside your apprehensions, brother; I shall have too much pleasure in hearing you explain their properties and uses, to desire to interrupt you; if my father has not provided any thing for this evening, may we not be favoured with your observations; I dare say we are all desirous of hearing them.

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## MR. HARCOURT.

Charles has made so good a choice, that you cannot be more agreeably amused, than by attending to what he has collected on this subject. The beauty and utility of forest trees are so obvious and striking, that the most careless eye must be sensible of them. Charles, begin by telling us which are the principal trees used for timber.

## CHARLES.

Oak, elm, ash, beech, poplar, walnut, chefnut, fir, and service tree; but they all yield to the oak, as well in beauty of foliage, as in the utility and duration of its timber. This noble tree forms our navies and cities; and, should the cultivation of it be neglected, we may vainly deplore the loss of those wooden walls, that have so long been our pride and defence.

## HENRY.

I do not understand what you mean by

that expression. I thought walls had always been built of brick or stone.

CHARLES.

I ask pardon for making use of a figurative term. The naval strength of our island is frequently called its wooden walls, and consequently depends very much upon the cultivation of the best species of timber. Every part of the oak has its use; the body is sawed into planks, to build ships and houses with; shingles, pales, laths, cooper's work, and wainscot, are made of oak; its wood is the most excellent for all works that require strength and duration. The bark is used by the tanner and dyer, to whom the very saw-dust is useful. The ashes and lie are made use of for bucking of linen, and to cleanse and purify wine. The roots are suitable to make handles for daggers, knives, &c. Its fruit, the acorn, supplies food for deer and hogs; and when bruised, all kinds of poultry will thrive on it. Man, before the cultivation of corn, fed on acorns, and

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in times of scarcity they may still prove a valuable substitute. Different parts of the oak are used in medicine; they are all of an astringent binding quality. The wood of this tree is the least adapted to works that require to be glued together, as it will not easily adhere, either with its own kind or any other wood.

CECILIA.

Is not ink made of oak galls? What part of the tree are they?

CHARLES.

Yes, they are used in making ink, as well as in the composition of various medicines; neither the oak apples nor the galls are any part of the tree; they are formed by insects, which deposit their eggs in the stem or leaf. There are various kinds of galls, formed by different insects, the inhabitants of a great variety of trees and shrubs.

MRS. HARCOURT.

The history of galls is so curious, that I cannot resist relating some particulars concerning

cerning them. Among the smaller insects, there are many which, either in the whole state of the worm, or during some of the changes they undergo, are of so tender and delicate a structure, that they cannot bear the contact of air; and others that are continually exposed to the ravages of a number of destroyers. Provident nature, in order to their preservation, has allotted them the galls of trees and plants for an habitation; instinct directs them to make them for themselves; for they never find these excrescences ready formed. Some of these insects are produced from eggs, laid by their parent animal on the stalks of leaves, and as soon as they are hatched, make their way into the leaf or stalk, and find a safe lodging in this recess, and suitable food in its juices. Others are inserted by the mother fly, even in the egg state, within the substance of the trees and branches. The parents of these are a peculiar race of flies, supplies

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supplied with an instrument at the end of their tails adapted to this purpose.

CECILIA.

How wonderful is the order of nature! the formation of the smallest insect, did we but know the purpose of its different parts, would furnish us with subject of admiration.

MRS. HARCOURT.

The galls produced by different insects have a very different internal structure; some of them have only one large cavity, in which a number of the animals live in community, others have several small cavities, with communications between each; and others have different numbers of little cellules each separate; and finally, there are others in which there is only one cavity inhabited by one insect. The inhabitants of these two last kinds live in perfect solitude during the worm state, and can have no knowledge of any other living creature, till they have passed through the intermediate  
state

state of chrysalis, and become winged animals, like those to which they owed their origin, and are ready in their turn to lay their eggs, and provide for the security of their future offspring. The variations in the different kinds of galls are not confined to their structure merely; each species has its peculiarity. Some of them are so hard, that they equal the hardness of the wood they grow upon; and when cut open, appear composed of films much more densely and closely arranged than those of the wood itself; others are soft and spongy, and resemble some of the tender fruits in appearance. The first kind are called gall-nuts, and the latter apple-galls, or berry-galls; many of them are beautifully coloured, and are very useful to the dyer, as well as the physician. The kermes is the most valuable of them all, and produces a scarlet dye, which is more durable than brilliant; it would take up too much time to mention the various particulars of each species,

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cies. Charles, resume the subject of the oak.

**CHARLES.**

There are many varieties of this useful tree, the different parts of each are capable of being turned to some advantage. Cork is the bark of a species of the holm oak. It grows in great abundance in Spain, Italy, France, &c. Depriving this tree of its bark does not injure it, for if timely care be not taken to strip it off, it splits and peels off of itself, being pushed up by another bark formed underneath. In order to prepare it for use, it is piled, in heaps, in ponds or ditches, then flattened with weights, and dried. It is principally applied to purposes, to which its peculiar quality of repelling moisture is adapted; such as soles for shoes, corks for bottles, and bungs for barrels. Waistcoats for swimming have also been made of it; its excessive lightness rendering it suitable for the purpose, as well as its power of repelling the water.

MR.

MR. HARCOURT.

The bark, or exterior covering of trees, is not only useful to man for various purposes, but it is formed for the preservation of the trees also; it defends them from external injury, and preserves them from the cold, when it is too severe for their tender bodies. The reason that evergreens retain their leaves during the rigours of winter, is, because their barks are of a more oily quality than the bark of other trees. There are a great many kinds of barks in use in the several arts. They are considered as powerful restoratives and strengtheners in medicine. The bark of the alder is used in dying; that of a particular species of birch is converted by the Indians into canoes, capable of holding twenty persons. A kind of rope is made of the bark of willows and linden-trees. The bark of the cocoa-tree forms the cordage of the Siamese, and most of the Asiatic and African nations. In the East-Indies they manufacture the bark of

of a certain tree into a kind of stuff or cloth, it is spun and dressed much after the manner of hemp; indeed flax and hemp, with all their toughness, are only the sap-vessels, or ligneous films of the bark of those plants. The East-Indian thread, produced from bark, is of a middle kind between silk and common thread; they sometimes manufacture it alone, at others mix it with silk, as in gingham, &c.

**SOPHIA.**

The ancients wrote their books on bark before the invention of paper, particularly on those of the ash and lilia, or lime-tree. The outer bark was not suitable for this purpose, they made use of the inner and finer, called philyra.

**MR. HARCOURT.**

And so durable was its texture, that there are manuscripts written on it still extant, a thousand years old. Bark is also serviceable as a manure.

**F****HENRY.**



HENRY.

Papa, I think you told me sometime ago, that birdlime was made of the bark of the holly.

MR. HARCOURT.

Good boy for remembering what you have been told; the usual method of preparing it, is by boiling it a sufficient time; the roots of hyacinths, asphodel, narcissus, and the black bryony afford a tough stringy juice, in great quantities, of the same kind.

MRS. HARCOURT.

I hope my Henry remembers also, that when he was told what materials composed birdlime, he was taught to despise its use. It is mean and unmanly to deprive a poor bird of its liberty, merely to gratify our inclinations, without being able to improve the condition of the little sufferer. And it is to be feared that, when naughty thoughtless boys have smeared the boughs with this substance, they have sometimes forgotten

forgotten to return to the place, and release the entangled prisoner, which, by their cruel neglect and carelessness, has been left to starve.

**CECILIA.**

And it would be still more piteous, was that prisoner a parent bird; its innocent little nestlings must suffer also a lingering death.

**AUGUSTA.**

My brothers have used birdlime, and set traps, without reflecting on the tortures they may have inflicted. I will repeat to them this conversation, and I am persuaded their hearts are too generous ever to be guilty of the same cruelty again.

**CHARLES.**

I shall next mention the elm, as second to the oak in size and beauty. It is particularly adapted to bear extremes of wet and dry, and therefore is frequently used for water-works, mills, pipes, pumps, aqueducts, &c. It is also suited to the pur-

poses of the wheelwright. The fineness of its grain renders it fit for works of ornament, such as foliages, &c. In times of scarcity, when hay and fodder have been difficult to obtain, the dried leaves of the elm have been substituted as food for cattle. Charcoal made of elm is inferior to none but that of oak.

### SOPHIA.

If charcoal be made of wood, what process is used to transform it to that state?

MR. HARCOURT.

They begin the operation by clearing a circular piece of ground, of turf and other combustible matter. This space is filled with wood cut into pieces of about three feet in length, and laid in the form of a pile, with a stake driven into the centre; the whole is covered over moderately thick with turf and other rubbish; after setting up a moveable screen against the wind, the stake is pulled up, and the pile set on fire, by pouring well kindled coals into the cavity.

vity. The wood chars without being consumed, by properly regulating the vent-holes, and keeping the mass covered. It is chiefly useful, where a clear strong fire, without smoke, is required. Mathematical instrument makers, engravers, &c. find charcoal very serviceable in polishing brass or copper-plates, after they have rubbed them clean with powdered pumice-stone. Charcoal and soot-black supply the painter and varnisher with the best and most durable blacks. One of the principal ingredients in making gunpowder is charcoal; but I do not mention this as an instance of its utility; happy would it be for mankind, did peace and good will prevail among them so powerfully, as to render such destructive inventions useless, but since this benign desire for universal harmony cannot be accomplished by the wishes of any one weak mortal, let each individual contribute his share towards preserving private peace, by subduing and regulating

his angry passions; and cultivating and improving his benevolent dispositions.

MRS. HARCOURT.

You have omitted to mention the baneful effects of the fume of charcoal; there have been many instances of persons who have been shut up in close rooms with charcoal fires in them, that have been found dead in a few hours. Charles, you must bear our interruptions with patience, you are now at liberty to proceed.

CHARLES.

I consider them as valuable additions to the few observations I have been able to collect; nor could I go on, unless you and my father will condescend to assist me. The ash, next to the oak, is of most universal use: it serves the soldier for spears, the carpenter, wheel wright and cartwright for ploughs, axle-trees, wheel-rings, harrows, and oars. It is useful to the turner, cooper, and thatcher, and is superior to all other kinds for garden palisades, hop-yards, poles, and spars.

HENRY.



HENRY.

You told us that ships were built of oak, but I cannot think that the body of an oak is either tall or strait enough to make the masts.

CHARLES.

The masts are made of fir or pine, which are tall strait trees, adapted to the purpose; they love a chalky soil, and thrive well in a cold climate. Norway produces them in great abundance; they form that kind of timber commonly called deal, which is so much in use for floors, wainscots, &c. It is supposed that the enormous wooden horse, introduced by the artifice of Ulysses within the walls of Troy, and which was the means of destroying that famous city, after sustaining a siege of ten years, was formed of this tree.

MR. HARCOURT.

The pine and fir trees are not valuable for their timber only, but turpentine, pitch, rosin, and tar are made from them by the following

following simple process. In the spring, when the sap runs most freely, they pare off the bark of the pine-tree, and cut a hole at the bottom to receive the sap; as it runs down, it leaves a white matter, rather thicker than cream, which is substituted instead of white wax, in the making of flambeaux. The liquor that runs into the hole at the bottom, is ladled into a large basket; great part of this immediately runs through into stone or earthen pots, prepared to receive it, and forms the common turpentine. The thicker matter, which remains in the basket, is distilled with a large quantity of water, as long as any oil is seen swimming upon the surface of the water; which when skimmed off, is common oil, or spirit of turpentine. The matter, that settles at the bottom of the still, is yellow rosin. When they have obtained all they can from the sap of the tree, they cut it down, and hew the wood into billets, with which they fill a pit dug in the earth, and

and then set them on fire; whilst burning, there runs from them a black thick matter, which is tar; if they desire to make it into pitch, they boil it, without adding any thing to it, and the work is completed. Charles, continue your account.

CHARLES.

The turner uses the wood of the beech-tree for dishes, trays, rims for buckets, trenchers, &c. The upholsterer forms it into chairs, stools, bedsteads, bellows, &c. The bark is used for floats for fishing-nets, instead of cork. It is very subject to the worm, which unfits it for purposes, where duration is requisite; but various parts of it are applied successfully to lighter uses. Bandboxes, scabbards for swords, and hat-cases are made of the thin lamina, or scale of this tree, and then covered with thin leather or paper. The mast or fruit fattens deer and swine; squirrels, mice, and dormice greedily devour the kernels of the mast; and some of our most favourite singing-birds,

birds; such as thrushes, blackbirds, &c. are preserved by them during the season that other food is scarce. The leaves, which afford an agreeable shade from the rays of the sun in summer, make the best and easiest mattrasses, if gathered in autumn. Walnut is valued by the joiner and cabinet-maker for its beautiful variations of colour and grain, and is used in inlaid works.

MRS. HARCOURT.

Of late years the drawing-rooms of people of fashion have been furnished with tables curiously inlaid with wood of various kinds, and the use of mahogany much laid aside. This gives scope for the exercise of taste in the artist, who, when at a loss for a colour in the natural wood, suited to his purpose, unites the art of colouring or staining it to that of design; festoons of flowers, fruits, birds, &c. admirably executed, decorate the chairs and other pieces of furniture, in the place of the heavy gilding that

that adorned the state rooms of our ancestors, who were more delighted with magnificence than elegance. The art of japanning and varnishing, which is now greatly improved, adds much to the beauty of painted or coloured wood. Substantial mahogany furniture is best suited to people, whose rank and fortune subject them to the rules of useful œconomy, and whose duty it is to prefer utility to splendour and shew. Sophia, do you recollect what country produces that species of cedar, the wood of which we call mahogany?

SOPHIA.

It is a native of the warmest parts of America, abounding in the islands of Cuba, Jamaica, and Hispaniola.

CHARLES.

There are many species of the cedar-tree; they were highly valued by the ancients for their durability and beauty. Solomon's temple and palace were both built with it, which is a mark of its high estimation.



mation. They grow to a very great size, and thrive best in a poor soil. The chestnut-trees that grow out of the lava of Mount Etna, in the island of Sicily, exceed any that I have heard of in magnitude. The agreeable traveller Brydon relates, that the most celebrated among these, is called the castagno de cento cavalli; and that it measures two hundred and four feet round, though said to be united below in one stem, and is a mighty bush of five large trees growing together. The hollow of one of these is supposed to contain one hundred sheep.

MR. HARCOURT.

Woods and groves were held sacred through all antiquity. The Pagans generally built their temples in or near them, and the druids and bards, who were the ministers of religion among the ancient Britons, held them in the highest veneration. Particular trees were frequently consecrated among the heathens to some favourite

vourite divinity. The laurel was devoted to Apollo, who presided over poetry and the fine arts; hence victors in the olympic games, successful poets, and conquering heroes have been rewarded with crowns of laurel. The myrtle was the favourite tree of Venus, and the vine appropriated to Bacchus. White poplar was used in the sacrifices of Jupiter, and the pine on the altar of Ceres. The Persian Magi burned their sacrifices with myrtle and boughs of laurel. The mythology of the Pagans extended the idea of the tutelary protection of woods and groves so far, as to believe that they were generally inhabited by dryads or wood nymphs.

MRS. HARCOURT.

I am not surpris'd that minds uninstructed in the principles of true religion, impressed only by enthusiastic notions of the Deity, should be affected by the appearance of awe and solemnity that is felt on entering a thick impervious shade. Mil-

G

ton,

ton, in his *Il Penferoso*, seems sensible of the alliance between the gloom of a tall forest and melancholy enthusiasms. He says,

Me, Goddess, bring  
To arched walks of twilight groves,  
And shadows brown that Sylvan loves,  
Of pine, or monumental oak,  
Where the rude axe with heavy stroke  
Was never heard the Nymphs to daunt,  
Or fright them from their hallow'd haunt;  
There in close covert, by some brook  
Where no profaner eye may look,  
Hide me from days garish eye, &c.

### CHARLES.

At the time of the Norman conquest, and for many years after, prodigious tracts of land in this island remained covered with forest trees and underwood; they were not suffered to be cleared for the purposes of cultivation, lest the game, which took shelter in them, should be destroyed. Hunting was a favourite diversion with the kings and great men of that age, and they un-

feelingly sacrificed the public welfare to their own private gratifications.

MR. HARCOURT.

As the number of inhabitants increased, agriculture gradually improved; the great power of the barons being diminished, the people at large became of more consequence, and it was found necessary to listen to their importunity, and convert some of these extensive royal forests into smiling corn-fields, the harbingers of comfort and plenty. It will be happy if the present generation do not run into the opposite extreme, and by neglecting the planting and preserving of timber, subject this country to the inconvenience and disadvantage of being supplied from a foreign market. Indolence, the love of present advantage, and want of attention to the good of posterity, are obstacles to the improvement and practice of this useful part of husbandry. Country gentlemen of fortune, who have leisure and money to advance, can hardly render  
their

their country a more acceptable service, than by raising valuable plantations of the best kinds of timber for the use of succeeding generations. Their reward must consist in the patriotism and benevolence of their intentions, and in the increasing value of their estates, as the period of the life of man gives no expectation of the planter enjoying the fruit of his own labour: an oak not arriving at perfection much short of a century. Charles, you must oblige us with a further account of this interesting subject to-morrow evening; the time of separation is arrived. Adieu, my dear children.

**CONVER.**



CONVERSATION XIV.

*On Forest-Trees, continued.*

AUGUSTA.

I HOPE I am not come too soon, I was so impatient to hear a continuation of last night's conversation, that I hastened tea, in order to be here early.

MRS. HARCOURT.

The same inclination seems to have drawn each of us here rather earlier than usual, a pleasing assurance, that our lectures are not tedious, but that our attendance is rather voluntary than forced.

MR. HARCOURT.

Instruction should always be rendered agreeable, in order to be beneficial to those that are to learn. The skill of a preceptor consists in gaining the affections of his pupils, and conveying knowledge in so gra-

dual and clear a manner, as to adapt it to the strength of the young student's capacity. Many a poor child has been disgusted with books and learning, by the heavy laborious tasks that have been given him to learn by heart, before he was capable of understanding them. The spirit of improvement, that distinguishes this enlightened age, shines in nothing more conspicuous than in education. Persons of genius have not thought it unworthy of their talents to compose books purposely for the instruction of the infant mind, and various ingenious methods of facilitating the acquisition of knowledge have been invented.

**MRS. HARCOURT.**

The austere manners of former times secluded children from the advantage of conversing with their parents or instructors; an unnatural distance was maintained between them; they were seldom admitted into the parlour, but to pay a ceremonious visit. The great Duke of Sully relates, in his  
Memoirs,

Memoirs, that his children were never suffered to sit at table in his presence on chairs with backs to them. The times are greatly altered in this respect for the better, and the familiar intercourse, that is now maintained with young people by their parents, and those, who preside over their education, affords them an agreeable opportunity of enlarging their minds, and attaining a fund of knowledge, by the easy medium of conversation. The liberality, with which young persons are treated in the present times, promises still greater hopes of advantage in the culture of the heart and disposition, than in the improvement of the faculties; by substituting real affection and friendship, in lieu of that distant respect, which is only the shadow of it.

## SOPHIA.

I flatter myself, that there is not one of us, that is insensible to the privileges we enjoy, by the indulgence of our kind parents; particularly that of being permitted,  
nay,

may, encouraged to open our whole bosoms to them.

### AUGUSTA.

Forgive me, if I almost envy you this unspeakable comfort; deprived of a mother, before I was capable of knowing my loss, I have been a stranger to those tender sensations, that unite the heart of a child to such a dear connexion. My father, though extremely fond of me, is often obliged to leave me for months together, on account of business, to the care of a governess that I cannot love; had I been so fortunate as to have been placed under such a woman as your Mrs. Selwyn, who treats you with kindness, is never angry without cause, and spares no pains for your improvement, I think I should have regarded her as an adopted mother, and loved her with equal tenderness; but the caprice, ill-humour, and indolence of Mrs. Marchmont discourage me from endeavouring to please her, and had it not been for the compassionate  
attention



attention of my dear Mrs. Harcourt, I must ever have remained ignorant and self-conceited, confirmed in error, a slave to bad habits, and my unsubdued passions.

MRS. HARCOURT.

Your gratitude enhances the value of my friendship too highly; you are the daughter of my particular friend, and I can never feel greater pleasure, than in paying a tribute to her memory, by doing you every service in my power. Charles, time passes swiftly, what tree do you begin with?

CHARLES.

I have finished my account of the principal trees used for heavy timber; the peculiar uses of the light sorts of wood remain for me to mention. Lime is used chiefly in carving, and for such purposes as pill-boxes, &c. The twigs are made into baskets and cradles, and all kinds of wicker-work. The inner bark has been used instead of paper. A copy of one of Cicero's works, written on this bark, was preserved



preserved as a great curiosity in Cardinal Mazarine's library.

HENRY.

I have been often greatly amused by watching the basket-maker that lives in the village; he uses osiers as well as the twigs of the lime. The vast variety of things that he makes, with such simple materials, has surprised me; sometimes I have sat down and worked with him, and were I to become very poor, I think I could easily follow his trade.

AUGUSTA.

Pray what variety of things does he make? I cannot recollect any thing but baskets.

HENRY.

In the first place, baskets of various forms and sizes, flasks, hampers, cages, lattices, cradles, hurdles, weirs for fish, and many other things that I cannot remember. Hazle is the best for hurdles, fishing

fishing-rods, and springs to catch birds with.

**CECILIA.**

Are not osiers a species of willow?

**CHARLES.**

Yes, they are a kind of low willow found by the water-side; the wood of the willow, of late years, is come into great demand for the purpose of making ladies' hats. It is cut into thin narrow slips, by means of a machine, and woven into the form of a hat, which has a pretty effect. This kind of wood is suited to purposes that require elasticity; the elder, on the contrary, is adapted to uses that need toughness, such as butcher's skewers, &c. Almost every part of this tree has its medicinal use, and pleasant-flavoured wine is made both from the flowers and fruit. Poplar is incomparable for all sorts of white wooden ware, as also for heels of shoes. The hardness of box, and readiness to take a polish, renders is very valuable to the turner for mathematical

matical instruments, pegs, nut-crackers, weaver's shuttles, rulers, rolling-pins, pestles, tops, chess-men, serews, lace bobbins, spoons, combs, &c. Holly affords the whitest wood of any, and is used in making dressing-boxes, and other fancy-works.

MR. HARCOURT.

Almost innumerable are the uses, to which different parts of trees, growing in every temperature of the world, are applied. The bodies for timber, the bark, leaves, blossoms, fruit, gums, resin, manna, sugar, contribute to our accommodation, and are rendered, by art and ingenuity, subservient to our use. Some trees afford food, others poison; the fibres of some supply us with cloathing, the timber of many with habitations; from some we extract medicines for the use of our maladies; from others, dyes of various hues; some are adapted to form musical instruments, by the sonorous quality of their wood; such as maple, fir, yew, and pear-tree; others, deficient

cient in that property, compensate the defect, by excellence of a different kind. Every tree has it's peculiar property, and scarce any, but may be converted to useful purposes; their branches afford a lodging to birds, their berries supply them with food; numerous insects inhabit every part of them. Let us admire the wise œconomy of nature, that supports and nourishes one part of her works by the produce of another. The seeds alone of trees and plants feed a vast number of animals, and yet there are a sufficient number left for the purpose of preserving their respective kinds.

MRS. HARCOURT.

The fecundity of vegetables is equally amazing with that of fishes. Mr. Ray asserts that one thousand and twelve seeds of tobacco weighed only one grain, and that from one tobacco plant, the seeds thus calculated amounted to three hundred and sixty thousand. The seeds of the ferns

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are,



are, by him, supposed to exceed a million on a leaf. This numerous reproduction prevents the accidental extinction of the species, at the same time that it serves for food for the higher order of animation. Nature has provided in a wonderful manner both for the nourishment and preservation of the immature seed. Every seed possesses a reservoir of nutriment, designed for the growth of the future plant, this consists of starch, mucilage, or oil within the coat of the seed; or of sugar, and sub-acid pulp in the fruit, which belong to it. In order to preserve them from injury, some are wrapped in down; as the seeds of the rose, bean, and cotton plant: others are suspended in a large air vessel, as those of the bladder-sena, staphylæa, and pea: many are furnished with a sort of wing or feather, as those of the thistle and anemone, which assists their conveyance by the wind from one place to another. There is a great analogy between the seeds of vegetables,



ables, and the eggs of animals and insects. They both include a perfect individual of their respective kinds, together with suitable nourishment to bring it to maturity, though the parts are far too minute for our investigation.

**AUGUSTA.**

Is it possible that so large a tree, as that majestic oak, which we so often admire, could ever be contained in a small acorn?

**MR. HARCOURT.**

The fact admits of no doubt; in some plants the embryo is partly visible, by the assistance of the best microscopes; and as nature governs by general laws, it is fair to surmise that the other kinds are propagated in the same manner.

**SOPHIA.**

Vegetables produce their seeds or embryo young unconsciously, and drop them on the ground, or suffer them to be waisted by the wind where accident directs. Insects shew a higher degree of instinct, and deposit their

eggs where they are likely to meet with food suitable to their different natures; and, after providing for their future security, by placing them in a proper situation, die; or, if their short existence is extended beyond one season, leave them to be hatched by the sun, without further care. How superior is the parental solicitude of birds! after composing a habitation for the reception of the eggs, with much labour and ingenuity, with what patience do they confine themselves to the task of hatching them! They seem to have lost every desire for flying about, and sit, day after day, till the young brood is hatched; their cares are then of another kind, they leave the nest, for a little while at first, to seek for food, which they distribute equally to their young ones. Their anxiety is continued till the nestlings are capable of providing for themselves, when they seem to forget their past affection, and wholly abandon the objects of their

their former tenderness to their own management.

MRS. HARCOURT.

Instinct, or that quality in animals which corresponds with reason in man, is bestowed on each creature in proportion to its rank or order in creation. The gradation of being is something like the links of a mighty chain, the immediate distinctions of which are scarcely perceptible; but when we compare the mineral, vegetable, and animal kingdoms together, the superior excellence of the latter is obvious; as the lowest degree of animal life is above the highest vegetable production. Let us proceed still further, and make a comparison of the most inferior orders of animals, such as oysters, &c. which seem only to possess a bare existence, void of faculties, or enjoyment, with man, a creature endowed with the noble quality of reason, capable of exercising very extensive intellectual powers, and enabled to under-

stand, admire, and investigate the works of his great Creator.

CECILIA.  
I never was so sensible of my own dignity before.

MR. HARCOURT.

Beware, my dear child, of doing any action unworthy of a being of so exalted a rank in the scale of existence; at the same time, learn humility, from the recollection, that it is rational to believe, that there are degrees of intellectual beings, as much above man, as an oyler is below him. We have strangely wandered from our subject. Charles, are you prepared to give us an account of the poison-tree, which you extracted from Dr. Darwin's notes on the Loves of the Plants?

CHARLES.  
The upas-tree is situated in the island of Java. It is surrounded on all sides by a circle of high hills and mountains; and the country round it, to the distance of ten or twelve miles from the tree, is entirely



barren. Not a tree, or a shrub; nor even the least plant or grass is to be seen. The destructive effluvia that proceeds from the tree is supposed to be the cause of this sterile appearance. The poison, which is procured from this tree, is a gum that issues out between the bark, and the tree itself, like the camphor. Malefactors, who are sentenced to die for their crimes, are the only persons, who collect the poison, and they are allowed this chance of saving their lives. After sentence is pronounced upon them by the judge, they are asked in court, whether they will die by the hands of the executioner, or go to the upas-tree for a box of poison? They commonly prefer the latter proposal, as there is not only some chance of preserving their lives, but also a certainty, in case of their safe return, that a provision will be made for them in future by the emperor. They are also permitted to ask a favour of the emperor, which is generally of a trifling nature, and usually



usually granted. They are then provided with a silver box, in which they are to put the poisonous gum, and are properly instructed how they are to proceed, while they are upon their dangerous expedition. They are told to pay particular attention to the direction of the winds, as they are to go towards the tree before the wind, so that the effluvia from the tree is always blown from them. They are likewise directed to travel with the utmost dispatch, as that is the only method of ensuring a safe return. They are afterwards sent to the house of an old priest, who lives on the nearest habitable spot, appointed by the emperor to reside there, for the purpose of preparing the souls of those criminals for eternity, who are sent to the tree, by prayers and admonitions. To this place they are commonly attended by their friends and relations. When the hour of their departure arrives, the priest puts them on a long leathern cap, with two glasses before their eyes, which comes down as

low

low as their breast, and also provides them with a pair of leathern gloves. Thus equipped, they are conducted by the priest, and their relations about two miles on their journey. Here the priest repeats his instructions, and tells them where they are to look for the tree. He shews them a hill, which they are to ascend, and that on the other side, they will find a rivulet, which will guide them to the upas. They now take leave of each other, and, amidst prayers for their success, the delinquents hasten away. Nowwithstanding the precautions that are taken, there are scarcely two out of twenty that escape. It is certain that from fifteen to eighteen miles round this tree, not only no human creature can exist, but that, in that space of ground, no living animal of any kind has ever been discovered. Every man of quality has his dagger or other arms poisoned with the gum of this destructive tree, and in times of war, the Malayans poison the springs, and other waters with it; by this treacher-

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ous practice, the Dutch suffered greatly during the last war, as it occasioned the loss of half their army. For this reason, they have ever since kept fish in those springs of which they drink, and sentinels are placed near them, who inspect the waters every hour, to see whether the fish are alive. If they march into an enemy's country, they always carry live fish with them, which they throw into the water, some hours before they venture to drink of it, by which means they have been able in some degree to provide for their security.

SOPHIA.

This is a very extraordinary account. How happy is it for mankind that these baneful trees are not commonly found; so subtle and irresistible does their poisonous influence seem to be, that were they scattered in different places, they might destroy all animals and vegetables, and change this beautiful world into a barren waste.

MRS. HARCOURT.

The most useful and beneficial things  
are

are bestowed in greatest plenty, which is an instance of the Divine Goodness, that calls for our daily gratitude.

AUGUSTA.

Of what use can the upas-tree be; would it not have been better, if such trees had never been created?

MRS. HARCOURT.

The wisdom of the Almighty, in the order of the creation, and our limited capacity to judge of the good of the whole, is a sufficient reply to such questions. But perhaps such instruments of destruction are permitted to make us sensible of our happy situation, and the many blessings we enjoy; at the same time, they serve as monuments of that power that can destroy a guilty world by a variety of means, and may have some influence to restrain the vices of those who are principally affected by sensible objects. The Caoutchouc, or Indian rubber being the produce of a tree, some account of the manner of its preparation will



not be foreign to the present subject. Cecilia will be kind enough to tell us something concerning it.

### CECILIA.

It consists of a very elastic resin, produced by a tree, which grows on the banks of the river of the Amazons. It grows to a very great height, perfectly straight, having no branches except at top. Its leaves bear some resemblance to those of the manioc: they are green on the upper part, and white beneath. The seeds are three in number, and contained in a pod, consisting of three cells, not unlike those of the palma christi; and in each of them there is a kernel, which being stripped and boiled in water, yields a thick oil or fat, which the natives use for the same purposes that we do butter. The juice, which is applied to many different uses, is collected chiefly in time of rain, because it flows then most abundantly. They make an incision through the bark, and there issues from it a milky

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milky liquor. It is said, that the means employed to harden it, is kept a profound secret. Though some assert, that it thickens, and becomes gradually solid by being exposed to the air. As it becomes solid, it shews an extraordinary degree of flexibility and elasticity. The Indians make boots of it, which water cannot penetrate: they have a method of smoking them, that makes them look like real leather. Bottles are also made of this substance, to the necks of which are fastened hollow reeds, so that the liquor that is contained in them may be squirted through the reeds by pressing the bottle. One of these, filled with water, is always presented to each of their guests at their entertainments, who never fail to make use of it before eating.

HENRY.

How I should laugh to see a company of people squirting water at each other?

MRS. HARCOURT.

There are various customs in different

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coun-

countries, that appear strange and unaccountable to the eye of an unprejudiced stranger, and seem to have arisen from caprice or accident. Habit renders us insensible to the absurdity of those we see constantly practised. Is it not as reasonable to wish health and happiness to our friends, at every mouthful we eat, as at every glass we drink?

HENRY.

It might be quite as reasonable, but it would appear very comical.

MRS. HARCOURT.

Civility requires that a traveller should comply with the customs of the countries through which he passes, provided they be perfectly harmless and innocent. Cecilia, continue your account of the caoutchouc.

CECILIA.

Flambeaux made of this resin give a brilliant light, and have no bad smell. A kind of cloth is also prepared from it, which the inhabitants of Quito apply to

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the same purposes as our oil-cloth or sail-cloth. It is also formed into a variety of figures by means of earthen moulds that serve both for use and ornament.

MR. HARCOURT.

Ever since this resin has been known in Europe, its chemical qualities, and other interesting properties, have been very diligently investigated. Its solidity, flexibility, and elasticity, added to it's quality of resisting the action of aqueous, spirituous, saline, oily, and other common solvents, render it extremely fit for the construction of tubes and other instruments, in which these properties are wanted. You have all experienced its usefulness in drawing, by erasing the erroneous strokes of black lead pencils, which has occasioned many to call it, lead-eater. Were we acquainted with the different properties of all the forest-trees, that grow in the various climates of the earth, the subject would be almost inexhaustible, and would furnish us

with new matter of admiration of the power and wisdom that formed them, and endued each with its peculiar distinction. Of those that are known we have only mentioned the most obvious and striking, and such as we are familiar with by name, from using their productions. Children, recollect, whether you cannot enrich our list, by adding an account of any trees remarkable for their produce or beauty, which Charles has forgotten or omitted.

#### SOPHIA.

The nutmeg-tree is found in the East-Indies, and is said to resemble a pear-tree; the fruit is inclosed in four covers; a thick fleshy coat, something like that of the walnut, contains the whole, which opens of itself when ripe: under this lies a thin reddish kind of net-work, of an agreeable smell, and aromatic taste, which we call mace, and is as valuable as the fruit itself; the shell is the third covering, and is hard, thin, and blackish; under this is a greenish  
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film of no use, and in it is found the nutmeg. According to Tavernier, birds are the instruments of propagating these trees by eating the nutmegs, and afterwards dropping them undigested upon the ground, and being softened and prepared for growth by the heat of the stomach, they readily take root. These birds are not permitted to be killed, on account of this circumstance, as the productions of this tree afford a very lucrative branch of commerce to the Dutch East-India Company, who monopolize the spice-trade, and by that means render it very profitable. Nutmegs and mace give an elegant flavour to high seasoned dishes, and are frequently used in medicine.

#### AUGUSTA.

I have seen and used the different kinds of spices, without ever reflecting on their nature; are cinnamon and cloves also the produce of trees?

#### SOPHIA.

Cinnamon is the bark of a tree, chiefly  
I 3 growing



growing in the island of Ceylon, and cloves are the fruit of a tall tree found in different parts of the East-Indies.

MRS. HARCOURT.

The tropical climates far excel those that approach nearer the Poles, in the beauty of the feathered race; their colours are more vivid, and dazzle with a richness and brilliancy, that the inhabitants of our groves are not adorned with; but, as if Nature took delight in dividing her gifts, they are deficient in the variety and extent of their tuneful powers, and must yield to the superior music of our warblers. In the vegetable productions they rise above us also in magnitude, luxuriance, and fragrance. The groves of pimento-trees in the West-Indies fill the air with their odours; their fruit is a small berry, which we call allspice, because it partakes of the flavour of many of the spices of the East. The pimento refuses the culture of man, and flourishes best when it grows spontaneously. It is

a tree

a tree of great beauty; the trunk is of a grey colour, smooth, and shining; it produces beautiful white flowers, which blow in the months of July and August. The leaves are equally fragrant with the fruit, and yield an odoriferous oil, which, when distilled, frequently passes for oil of cloves.

**SOPHIA.**

Dr. Hawkesworth relates that the bread-fruit is found at Otaheite, in the South Sea, on a tree about the size of a middling oak. It is as large as our gourds, and the surface covered with a kind of network. The eatable part lies between the skin, and the core: it is as white as snow, and of the consistence of new bread. It has an insipid sweetish taste, resembling that of the crumb of wheaten bread, mixed with a Jerusalem artichoke. It is roasted and baked before it is eaten, and admirably supplies the place of bread, to a people ignorant of the arts of cultivation.

**CECILIA.**

## CECILIA.

I must not suffer my favourite mulberry-tree to be forgotten; when adorned with the yellow cones of the silk-worm, like so many balls of gold, I think its appearance must equal the beauty of any you have mentioned; and we owe to the insect it nourishes and maintains the most delicate and agreeable texture that we wear; therefore you must allow it is inferior to few in usefulness.

## MR. HARCOURT.

Cecilia is determined to defend her favourite with spirit; and indeed she has done it ably, for without the mulberry-tree, we must relinquish the use of silk, so well adapted to the clothing the inhabitants of warm climates, and which contributes so much to the elegance and magnificence of dress and furniture in all countries, where it is known; but, my dear children, where time is spent agreeably, it also passes swiftly. Our hour of separation is already past.

Let

Let us retire, and seek that repose, which is necessary to refresh our weary spirits, and invigorate us for the pursuits of to-morrow.

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## CONVERSATION XV.

MR. HARCOURT.

OUR late conversations on the subject of the various kinds of timber have led me to consider their extensive use in the building of ships; whether for the purpose of conveying us to the distant regions of the earth, or transporting the productions of one climate to its opposite extreme.

HENRY.

Pray, tell us how they first contrived to build a ship; it must be very curious to know the manner of putting the parts together on the water.

AUGUSTA.

I am far more desirous of being informed

ed of the name of the man, who had sufficient courage to venture upon so unstable an element.

MRS. HARCOURT.

A long period of time was necessary to bring either navigation, or the art of constructing vessels, to any degree of perfection. The first efforts were rude and imperfect. Observation taught the early inhabitants of the earth that light substances floated upon the surface of the water: experience, that sure but slow guide, instructed them, that any thing would swim, that displaced a body of the fluid equal to its own weight. It is probable that the inhabitants of countries bordering on the sea, at first only ventured close along the shore on a few planks fastened together, and pushed themselves along by the assistance of a stick or pole: repeated attempts suggested various improvements, till by degrees, men became capable of building floating houses, and sailing in them to the  
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most distant regions of the earth. The advancement of science in general, still contributes to improve and perfect the invention of constructing vessels, and guiding them through the pathless ocean. That small instrument, the mariner's compass, said to be the contrivance of Flavio, a Neapolitan, about the beginning of the fourteenth century, has been of the greatest advantage in enabling persons at sea to know the course they are pursuing. It principally consists of a needle of iron, impregnated with the magnetic powers of the load-stone, which influences it always to point nearly to the north; thus, by being exactly acquainted with one of the cardinal points, it is easy to find out the others. As Charles is a better classical scholar than I am, I leave him to reply to Augusta's query.

### CHARLES.

It is supposed that Neptune, called by the pagans, god of the sea, was the founder  
of

of these inventions, and that his discovery was immortalized by attributing to him the dominion of the element he had subdued. Many give the honour to Dædalus, and imagine that the wings, he is said to have invented to save himself from the resentment of Minos, king of Crete, whom he had offended, were nothing but sails, which he applied to the vessel in which he escaped; but all these accounts are uncertain. Scripture affords us some authentic records, Noah was certainly one of the earliest ship builders, and the ark the first large vessel that is mentioned in history. Profane history relates an extraordinary account of two other ships of prodigious magnitude; the first built by order of Ptolemy Philopater, king of Egypt, which carried four thousand rowers, four hundred sailors, and three thousand soldiers; the other belonged to Hiero, king of Sicily, and was built under the direction of Archimedes. It contained all the variety of apartments belonging

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ing to a palace; banqueting-rooms, galleries, gardens, fishponds, stables, mills, baths, a temple of Venus, &c. and, to render it complete, it was encompassed with an iron rampart, and eight towers, with walls and bulwarks, furnished with machines of war.

MR. HARCOURT.

When the history of a very remote period records events, that exceed rational belief, it is reasonable to suppose, that the circumstance related was regarded as extraordinary at the time it happened; and that the historian, desirous of transmitting the fame of his native country to posterity, has enlarged the fact, and related it in the glowing colours of fiction. In this light I consider the description of Hiero's vessel. But to return to the simple inventions of the earliest navigators, the various tribes of savage nations, that inhabit the sea-coast, will throw the best light on the subject. Canoe is the name given to the little boats generally used by those who dwell in both

Indies, as well as by the negroes in Guinea. They generally make them of the trunks of trees hollowed out, and sometimes of pieces of bark fastened together: they differ in size, according to the tree of which they are made; they are rowed with paddles, something like the oars of a boat, and but rarely carry sails. The loading is placed at the bottom; but, as they have no ballast, they are frequently turned upside down. The want of a rudder, with which they are not furnished, is supplied by the hind paddles. The negroes of Guinea use the same sort of canoe, though made in a different manner: they are long shaped, having only room for one person in width, and seven or eight in length, and shew but little of the wood above the water. Those accustomed to row them are extremely dexterous, not only in striking the paddles with cadence and uniformity, by which the canoes seem to skim along the surface of the water; but also in balancing the vessel with  
their

their bodies, and preventing their overturning, which without this address, must continually happen from their extreme lightness; but what is still more extraordinary, that when this accident does occur, many of them have the dexterity to turn them up again even in the water, and mount them again.

### CECILIA.

I have often remarked, that savages shew great ingenuity in their simple contrivances, and that they excel the inhabitants of civilized countries in personal address and dexterity. What European can vie with some of the Indians in running, when they pursue their game in hunting? or in patience, whilst they suffer the want of food when they happen to be disappointed of obtaining it in the woods? The art with which they contrive stratagems in war, to deceive their enemies, shews great cunning and skill; though I despise the principle, I admire the fertility of their invention.



When I reflect upon their superiority in these things, I am discontented, because I cannot find a satisfactory reason why ignorance should excel knowledge in any thing.

MR. HARCOURT.

There are many causes why a savage should perform acts of skill and dexterity, in a manner superior to a person, whose mind has been enriched by the cultivation of science; but there can exist no instance of ignorance being preferable to knowledge. The intellectual powers of a savage, though capable of receiving the same impressions, as a man of science, are, from want of education, confined to very few objects; on those he bestows his whole attention, and consequently attains a great degree of perfection in the things that belong to them. Do you not think that Charles would jump better than any of his acquaintance, if, he passed whole days or weeks in no other occupation but that exercise.

CECILIA.

CECILIA.

Certainly; I have no doubt of it.

SOPHIA.

The subsistence of savages depends so much upon their success in fishing and hunting, that, without skill in these arts, they must frequently be destitute of provisions; it is likely therefore that their whole education consists in attaining this dexterity. Although they manage their canoes with such surprising cleverness, I suppose they do not venture far out to sea.

MR. HARCOURT.

Seldom to a greater distance from shore than four leagues. They weave mats with rushes, of which they make the sails. On return from a voyage the canoes are not left in the water, but drawn on shore, and suspended by the two ends, till they are dry, in which state they are so light, that two men can easily carry them on their shoulders. Different causes have operated in

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forming the peculiar character of different nations. The narrowness and poverty of the land inhabited by the Phœnicians and Tyrians, combining with their natural genius for traffic, rendered them the first nation of navigators among the ancients. Lebanon and the other neighbouring mountains supplying them with excellent wood for ship building, they were in possession of a numerous fleet, before other nations had acquired any knowledge in the art beyond that of coasting in small vessels. The commerce they established with foreign countries, by the means of their skill in naval affairs, enriched them to an extraordinary pitch of opulence. The employment given to such numbers of hands, by this enterprising and commercial spirit, increased the population of the country to such a degree, that they were obliged to found colonies in other countries, the principal of which was that of Carthage. In time Carthage became more powerful than  
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the mother country, and extended her navigation into Europe, as far north as Britain. The rivalship that subsisted between the states of Carthage and Rome, for many years, ended in the total destruction of the former, and left Rome without a competitor. This celebrated city in her turn became the prey of the Goths and Vandals, and with her fall, not only learning and the polite arts, but also the useful one of navigation, declined, rather than advanced for some time. The Crusades, that monument of human folly and enthusiasm, contributed to restore and accelerate the revival of commerce and navigation, by the number of vessels that were necessary to convey those vast armies into Asia, on this wild enterprize. The invention of the compass, combined with the voyages of discovery and other causes, to promote the advancement of this useful branch of science, and raise it to its present state.

CHARLES.

## CHARLES.

Which of the nations of Europe patronized the early voyages of discovery?

—MR. HARCOURT.

Had John II. of Portugal listened to the proposal of Columbus, who was a native of Genoa, to give him encouragement to explore a passage to India, by sailing towards the west, across the Atlantic Ocean, that nation might have claimed this honour; but John treated his scheme with contempt; and Columbus, disgusted with his behaviour, quitted Portugal, and went to Spain, in order to apply to Ferdinand and Isabella, who reigned conjointly at that time. Eight years were spent in repeated applications before he succeeded. At length, in August 1492, this great man, furnished with a small fleet of three ships, set sail, and steered directly for the Canary Islands; from thence he proceeded due west, through unfrequented and unknown seas; and, after many difficulties arrived at  
Guanharic.



Guanharic, one of the large cluster of islands called the Bahama Isles, and returned to Spain, without having obtained his principal object, of discovering another continent, which he supposed to exist on the western side of the globe. He made a second voyage without any better success. Undaunted by so many disappointments, he undertook a third voyage, and actually fell in with the vast continent of America; which, after all his indefatigable labour, received its name from a Florentine, Americus Vesputius, who only followed the footsteps he had marked out. Succeeding navigators made new discoveries, and Portugal at length saw the advantage of patronising these enterprises. It does not seem that our countrymen turned their attention this way till a later period. In 1577, Sir Francis Drake undertook, and completed a voyage round the world, in about three years. Our late discoveries have

have been principally in the Pacific Ocean, and, to the honour of the British nation, the name of Captain Cook will ever remain distinguished among the chief navigators. It was not the thirst of digging the gold from the mine, but the desire of diffusing the arts and advantages of civilization among his fellow creatures, that induced him to explore unknown seas. He wandered from one nation of strangers to another, offering the olive branch of peace, and desired rather to form an alliance of friendship with them, than to oppress them by tyranny and injustice.

### CHARLES.

Although England is now celebrated for the superiority of her navy, it appears that the northern parts of the world were slow in attaining this perfection; for, when Cæsar invaded Britain, the natives opposed him in vessels of an odd form, like large tubs, the sails were composed of leather, and

and iron chains supplied the place of cables.

MRS. HARCOURT.

The Saxons, after being sometime settled in this island, became sensible that its surest defence would be a formidable navy, and applied themselves vigorously to build ships of war. Ethelred, in order to maintain a powerful force at sea, made a law, that whoever possessed 300 hides of land, should build and man one ship for the defence of his country. Our insular situation has obliged us to bestow great attention in improving and advancing the art of ship-building to perfection. It is also our best policy to encourage a nursery of British seamen, which is done in part by the numbers that are employed in the Newcastle colliers, and other trade fleets. This is the reason that coal-pits in the neighbourhood of London are not suffered to be worked. The superiority of the British fleet for strength and beauty, as well as for  
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the bravery of its mariners, is undisputed, and our nation has long been considered as mistress of the sea.

SOPHIA.

In the reign of Queen Elizabeth our royal navy was in a very flourishing condition.

MR. HARCOURT.

The progress of commerce and navigation naturally keep pace together. Trade first gave occasion to the fitting out large fleets of ships, and as that increased, the cargoes became more valuable, and each nation, jealous of her property, found ships of war necessary to convoy her merchantmen in safety to their destined ports. Ships, intended for different purposes, required a variety of forms and sizes, as well as a diversity of construction and rigging. The form of fishes being admirably adapted to divide the fluid element, and make a way through the waters, furnished hints to ship-builders in forming the hulks of vessels.

vessels. Naval Architecture comprehends three principal objects. In the first place, it is necessary to give the ship such an exterior form, as may be best suited to the service for which she is designed. Secondly, to find the proper figures of all the pieces of timber that compose a ship. And lastly, to provide suitable accommodations for the officers and crew, as well as for the cargo, furniture, provisions, artillery, and ammunition. A ship of war should be able to sail swiftly, and carry her lower tier of guns properly; it is necessary for a merchant-ship to contain a large cargo of goods, and be navigated with few hands; and each kind should be able to carry sail firmly, steer well, drive little to leeward, and sustain the shocks of the sea without being much strained. Charles, you have visited a dock-yard, can you give your brother a satisfactory account of the method used in building ships.



## CHARLES.

The vessels, that I saw building, were supported in the dock, or upon a wharf, by a number of solid blocks of timber, placed parallel, and at equal distances from each other. The workmen call this being on the stocks.

## MR. HARCOURT.

This is an answer to your enquiry, Henry, how they contrived to build ships upon the water: had you reflected a moment, you would not have asked such a silly question.

## HENRY.

I asked without considering that it would be impossible. Forgive me, if I am now desirous of knowing how such large bodies are removed into the water.

## MR. HARCOURT.

I commend a proper curiosity; but, in future, before you ask a question, consider whether it be a reasonable one, and whether, by reflection on the subject, you can-

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not resolve it yourself. When they begin to build a ship, it is supported upon strong platforms, inclined towards the water. All things being ready for the launch, the wedges and supporters are cut away, and the parts over which the vessel is to pass, are well daubed with grease and soap, to make her slide more easily. Every obstruction being removed, by degrees she slides into the water. Very large vessels are frequently built in dry docks, and when finished, the flood-gates of the dock-yard are opened, and the water rushes in, and raises the vessel to the surface. Charles, are you able to recollect the principal parts that compose a ship? I took some pains to make you master of the subject.

CHARLES.

It is a difficult one, but I will endeavour to give the company the clearest idea of them in my power. The first piece of timber laid upon the block is generally the keel; the pieces of the keel are scarped to-

gether, a term used for fastening large pieces of timber together in a manner somewhat similar to what the carpenters call dove-tail; thus united they form one entire piece, which constitutes the length of the vessel below. At one extremity of the keel is erected the stem, which is a circular piece of timber, into which her two sides are fixed at the fore end; at the other extremity of the keel, is elevated the stern-post, into which are fastened the after planks, and in the stern-post hangs the rudder. The transoms and fashion pieces are large pieces of timber that form the width of the ship. These being strongly united into one frame, are elevated upon the stern-post, and the whole forms the structure of the stern, upon which the galleries and windows, with their ornaments, are afterwards built. The stern and stern-post being thus elevated upon the keel, and the keel being raised at its two extremities by pieces of wood, the midship floor timber is placed  
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across the keel.. The floor timbers, both before and abaft\* the midship frame is then stationed in its proper place upon the keel; after which the kelson, which is the next piece of timber to the keel, and lying directly over it, is fixed across the middle of the floor timber. The futtocks, or ribs, which form the sides, are then raised upon the floor timbers, and the top timbers being afterwards fastened to the head of the futtocks, completes the exterior figure of the whole.

MR. HARCOURT.

Considering the subject is so intricate, you have described it with tolerable clearness.

MRS. HARCOURT.

You have given us an idea of the external figure of a ship, the inside finishing also requires a great deal of art. It is divided into several decks or floors destined

\* Abaft, a sea term for behind.

to different uses. Large ships have three decks, smaller but two, and there are vessels that are only half decked. The decks are divided into several apartments. The best cabin, for there are sometimes more than one, corresponds with the drawing-room of a house, and is appropriated to the reception of visitors. The cuddy serves for an eating-parlour; there is also on board an India-man a cabin, behind the cuddy, called the round-house. Besides these, separate apartments are provided for the different officers, as cook-room, gun-room, &c. &c.

HENRY.

Do they lie in such beds as we do?

MRS. HARCOURT.

They would find them very inconvenient, on account of the motion of the ship; they use hammocks at sea, which are beds hung to the ceiling, and they swing backwards and forwards as the ship rolls.

Mr.



MR. HARCOURT.

A ship is very imperfectly described without naming the masts, sails, and rigging. The masts are very tall poles fixed in the deck, to which are attached the sails, and the rigging. The sails are generally made of a peculiar kind of coarse hempen cloth, and their use is to gather the wind, by the force of which the vessel is driven along; the rigging is composed of ropes, and serves to furl and unfurl the sails as occasion requires; it also forms a sort of rope-ladders, by which the expert mariners ascend to the top of the masts.

CECILIA.

It must require a vast sum of money to build a ship.

MR. HARCOURT,

A man of war of 74 guns is calculated to cost £30,000, before she is armed or equipped.

CHARLES.

What an immense sum must be requisite

sute to raise and maintain a fleet! Into how many orders or ranks is the British fleet divided?

MR. HARCOURT.

It is distributed into six rates, exclusive of the inferior vessels that usually attend on naval armaments, as sloops of war, armed ships, bomb-ketches, fire-ships, &c. Ships of the first rate mount an hundred cannon, they are manned with 850 men, including officers, seamen, marines, and servants. A captain of a man of war, when on board, is an absolute sovereign, and rules with unlimited sway, but on his return is liable to give account of his conduct in a court martial, as it is a principle of the British constitution, that every subject, of whatever rank, if injured at sea or land, has an equal right to redress.

AUGUSTA.

Pray what difference is there in the meaning of the words ship and vessel?

M.

**MR. HARCOURT.**

Vessel comprehends all floating machines, that move in water; we distinguish them into two general classes; high bottomed or decked vessels, which are those that move wholly with wind and sail, and live in all seas; and flat-bottomed vessels, which go both by oars and sails, such as boats, barges, wherries, &c.

**HENRY.**

You mentioned a rudder just now, I do not know what it is.

**MR. HARCOURT.**

The rudder is a piece of timber suspended to the stern-post, by which the vessel is guided, in this or that direction, according as the sides of the rudder are opposed to the water. An anchor is a large strong piece of iron, crooked at one end, and formed into two barbs, resembling a double hook, and fastened at the other end by a cable; its use is to keep the vessel confined

fined to one place, by letting it down into the ground.

MRS. HARCOURT.

As it is sometimes their last resource in time of danger, it is considered as emblematical of hope, which is frequently represented by a female figure, resting upon an anchor, and looking up to Heaven for deliverance.

SOPHIA.

Are not flags displayed on the masts of ships, to denote the nation they belong to?

MR. HARCOURT.

They not only serve that purpose, but also distinguish the rank of the admiral or commander on board. In the British navy the flags are either red, white, or blue. The admiral or commander in chief carries his flag on the foremast, and that of the rear admiral is carried on the mizen-mast. Different signals are used at sea, according to circumstances; and, during an engagement, the orders of a commander

are

are given and understood with wonderful precision. James II. is said to have invented the principal signals used in our fleet.

### CECILIA.

I cannot imagine how the poor sailors avoid running against the rocks in a dark night.

### SOPHIA.

Light-houses are erected in proper situations, to warn them of their danger, where such large fires are made as to be visible at a considerable distance. The Pharos of Alexandria was a building of this kind. It was esteemed one of the seven wonders of the world, on account of the beauty of its structure, and the richness of its materials. It stood on a small island at the mouth of the Nile, and consisted of several stones raised one over another, adorned with columns, ballustrades, and galleries of the finest marble and workmanship, to which account some writers add, that the architect



architect contrived to fix mirrors so artificially against the highest galleries, that all the vessels, that sailed on the sea for a considerable distance, were reflected in them.

MRS. HARCOURT.

The clock strikes, and warns us that it is time to retire. Henry has been so attentive, that I expect he will dream of undertaking a voyage.

HENRY.

I wish I may, by that means I should enjoy the pleasure without partaking of the danger.

MRS. HARCOURT.

Good night, my little sleepy sailor.  
Adieu, dear children.

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## CONVERSATION XVI.

HENRY.

I HAVE longed all day for the time of meeting. I have been thinking of several things concerning ships, which appear wonderful to me; in the first place, I cannot imagine how they contrive to store up provisions for so many people for several months without spoiling; we are obliged to go to market almost every day, but you know there are no shops at sea.

MRS. HARCOURT.

Consequently the ship's crew cannot live on fresh meat, neither can they procure fresh vegetables, which, with the want of fresh water, are the principal causes of the dreadful disease, called the sea scurvy, to which persons in long voyages are very subject. Beef and pork, well salted down,

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with hard biscuit, form the usual food of a sailor.

### AUGUSTA.

I cannot eat either salt-meat or hard biscuit; what would become of me, were I obliged to go to a very distant country?

### SOPHIA.

Necessity, my dear Augusta, has taught many to submit to great hardships; suppose your father were obliged to go to the West-Indies, would you prefer being separated from him, or attending him thither, and suffering some inconveniences for a few weeks; surely you would not hesitate which to choose?

### AUGUSTA.

My father frequently tells me, that it is not unlikely that his affairs will require his presence in Jamaica. I have entreated him to let me go with him, but I never considered the difficulties of the voyage. Accustomed as I have been to a variety of dishes every day at table, and a desert of fruit and preserves afterwards,

terwards, I should find it hard fare to dine on salt-beef and biscuit, and to exchange my soft bed for a hammock.

**MR. HARCOURT.**

This confession shews the great inconvenience of an habitual indulgence in our mode of living; had you been used to eat only of one dish, and sleep upon a mattrass, you might easily have accommodated yourself to an alteration for the worse for a little time. Temperance is not only a virtue, but a great advantage to health, and on many occasions diminishes the difficulties we are liable to meet with. One reflection ought to be sufficient to reconcile us to any temporary hardship, that thousands of our fellow creatures suffer, what we think so painful to undergo for a few hours. The consideration of these things will teach us to transfer a little of that solicitude for our own personal enjoyment, to a tender care for the wants and sufferings of others.

**M 2****CHARLES.**

**CHARLES.**

The captains and officers have their tables supplied with fresh provisions; sheep, pigs, and poultry are kept on board ships for that purpose. I have also seen a cow which afforded milk and cream for the captain's table. Minced meat and sweet-meats are generally among his stores, and any other delicacy that will keep; therefore, Augusta, you may lay aside your apprehensions, for although you could not enjoy all the luxuries you do at home, you may make a tolerable shift for a month or two

**CECILIA.**

The comparison of my condition, and that of the poor sailors, would prevent my enjoyment of the indulgencies, that my superior rank procured me.

**MRS. HARCOURT.**

Bring that principle home to your own heart; you constantly enjoy many gratifications,



tions, that our poor neighbour Mary Benson has not even an idea of.

### CECILIA.

That very thought reconciles me to the difference; but were she a spectator of my daily meals, and obliged to rest contented with her present scanty fare, I should be induced to go shares with her.

### MR. HARCOURT.

Our wants vary according to our habits and education; let us be careful not to increase them by pampering a false taste for unnecessary indulgence; a life of hardship is not confined to sailors, many employments subject those, who are engaged in them to endure it patiently. Miners are deprived of light, and the society of the rest of mankind. Those who work in the quicksilver mines are said not only to lose their health, but generally die in a few years; extremes of heat and cold, hard labour, and scanty fare are the portion of the greater part of mankind; but happiness

does not depend upon the enjoyment of luxury; these people possess as large a share of it, as their richer and envied neighbours; each condition has its advantage; we are the children of one common parent, who has deemed it wise to distribute mankind into different ranks and orders in society, and to render the poor and the rich dependent on each other, that they may be united by the powerful tie of reciprocal benevolence and affection.

SOPHIA.

I believe I should suffer most from want of fresh water; what contrivance do they use as a substitute for this necessary comfort?

MR. HARCOURT.

Many ingenious philosophers have bestowed much time and attention to remedy this defect; the simplest and best method of distilling sea-water, and rendering it fresh, is the invention of Dr. Irving. In order to have a clear idea of his method of accomplish-

accomplishing this desirable purpose; suppose a tea-kettle to be made without a spout, and a hole in the lid in the place of the knob; let this kettle be filled with sea-water, the fresh vapour, which arises from the sea-water, as it boils, will issue through the hole in the lid; fix the mouth of a tube in that hole, and the vapour of fresh water will pass through the tube, and may be collected by fitting a proper vessel to receive it to the end of the tube. Dr. Irving, in a similar manner, has adapted a tin, iron, or copper tube of suitable dimensions, to the lid of the common kettle, used for boiling the provisions on board a ship. The fresh vapour, which arises from boiling sea-water in the kettle, passes through this tube into a hoghead, which serves as a resorvier.

#### CHARLES.

This is ingenious, and may alleviate the evil in a degree; but I cannot suppose it can be so agreeable as clear water fresh from a spring,

a spring, and it must be scarcely possible to procure a sufficient quantity for the comfortable accommodation of so many persons.

MRS. HARCOURT.

Fresh water is often far more precious than the richest wines on board a ship; the poor men have frequently been obliged to be limited to a certain quantity of it a day. True riches consist in a sufficiency of those things that are necessary to our life and health. Of what use would gold be to a man in a desert? a cup of cold water, or a sack of corn would be, in comparison, an inestimable treasure.

CECILIA.

Surely it must be difficult to preserve the health of persons confined long on board, especially in warm climates.

MR. HARCOURT.

A considerate humane commander pays great attention to the health and morals of his ship's company; cleanliness, and the free

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free admission of fresh air between decks, are points of the utmost importance, as well as a sufficient supply of such vegetable food as can be preserved; as peas, oatmeal, &c. After every precaution that can be taken, there are inconveniences peculiar to this manner of life.

**HENRY.**

The desire of seeing foreign countries, with the different manners and customs of the inhabitants, would induce me to face every danger, and overcome every difficulty.

**MR. HARCOURT.**

Henry is quite a hero; many have felt an invincible inclination for going to sea, which cannot be accounted for, on any other principles, than that men are formed with various propensities, adapting them to a variety of pursuits. Were it otherwise, all men would chuse the easiest profession, and no one would be found to undertake any employment, that threatened either difficulty or danger.

**AUGUSTA.**



## AUGUSTA.

In relating the progress of navigation, crusades were mentioned; I should be glad to be informed, what they were, as I am entirely ignorant of the meaning of the word.

## MRS. HARCOURT.

Towards the end of the eleventh century, the zeal of a fanatical monk, called Peter the Hermit, who conceived the idea of leading all the forces of Christendom against the infidels, and of driving them out of the possession of the Holy-Land, was sufficient to give a beginning to this wild undertaking. He ran from province to province, with a crucifix in his hand, exciting princes and people to this holy-war. Wherever he came, they caught the infection of his enthusiasm, not only nobles and warriors, but men in the more humble stations of life: shepherds left their flocks, and mechanics their occupations; nay, even women and children engaged

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with ardour in this enterprize, which was esteemed sacred and meritorious; contemporary authors assert, that six millions of persons assumed the cross, which was the badge that distinguished such as devoted themselves to this holy warfare. But from these expeditions, extravagant as they were, beneficial consequences arose, which had neither been foreseen nor intended. It was not possible for the crusaders to travel through so many countries without receiving information and improvement, which they communicated to their respective countries, at their return. The necessary provision and accommodation for such vast numbers of people excited a spirit of commerce, and in its consequences advanced the progress of navigation; a spirit of improvement is raised by the communication of different nations; those people, who are destitute of commerce, remain a long time stationary.

SOPHIA.

## SOPHIA.

How often do we see good arise out of apparent evil? Who could have supposed that the mistaken enthusiasm of an obscure monk could have been productive of such public benefit?

## MR. HARCOURT.

It is useful to trace things to their causes; many events, that have made great noise in the world, have arisen from causes apparently trifling, and inadequate to the effects produced. The means of introducing the reformation into this country, with all its happy consequences, was the unlawful love of Henry VIII. for Anne Boleyn. He sought only his own gratification; but the hand of Providence converted his corrupt inclinations into an instrument of good to his people. Discoveries in the arts have frequently been the result of accident. This should teach us the habit of observation. The bulk of mankind observe little, and reflect less, which

which accounts for many persons in advanced life having few ideas of their own.

*CECILIA.*

You have so often inculcated the advantage of observing the nature and texture of every thing we use, that it is become an amusing custom, when we are by ourselves, to question each other on the qualities of those things that attract our notice. This morning at breakfast, tea, coffee, and chocolate, were the subjects of enquiry; none of us were capable of giving a good account of them, without having recourse to books for information; we each chose our topic, and I believe Henry can inform us in what manner coffee is cultivated and prepared. Charles selected the cocoa-tree for his investigation. The tea-tree of course fell to my share.

*MRS. HARCOURT.*

Pray let us be amused with the result of your researches, Cecilia; your brothers

will not take the lead, they resign the precedence to you.

### CECILIA.

The tea-tree, according to Linnæus, is of the polyandria monogynia class; the cup is a very small, plane, permanent, perianthium, divided into five or six roundish obtuse leaves; the flower consists of six or nine large, roundish, concave, and equal petals; the stamina are numerous filaments, about two hundred, and are very slender, capillary, and shorter than the flower; the antheræ are simple; the germen of the pestil is globose and trigonal; the style is subulated, and of the length of the stamina; the stigma is simple; the fruit is a capsule, formed of three globular bodies growing together; it contains three cells, and opens into three parts at the top. The seeds are single, globose, and internally annulated. It is supposed that there is but one species of this tree, and that the difference between green and bohea tea, consists



sists only in the manner of cultivation, and drying the leaves. The root resembles that of the peach-tree, the leaves are long and narrow, and jagged all round. The flower is much like that of the wild rose, but smaller; the fruit contains two or three seeds of a mouse colour, including each a kernel. These are the seeds by which the plant is propagated; several of these are put promiscuously into a hole, four or five inches deep, at proper distances from each other, and require no other care. In about seven years, the shrub rises to a man's height, which it seldom greatly exceeds.

MR. HARCOURT.

You have forgotten to tell us of what country this shrub is a native.

CECILIA.

It is cultivated in Japan, and grows abundantly in China, where whole fields are planted with it, as it forms a very extensive article of commerce among the Chinese. It loves to grow in vallies, at the foot

of mountains, and upon the banks of rivers, where it enjoys a southern exposure to the sun, though it endures considerable variations of heat and cold, flourishing through the different degrees of climate in the extensive kingdom of China. Sometimes the tea-trees grow on the steep declivities of hills, when it is dangerous, and in some cases impracticable to get at them. The Chinese are said to make use of the large monkees, that dwell among these cliffs, to assist them in obtaining the valuable leaves of the tea-trees: they irritate these animals, and, in revenge, they climb the trees, and break off the branches, and throw them down the precipice, which gives the gatherers an opportunity of reaching them.

### AUGUSTA.

What part of this shrub is applied to our use?

### CECILIA.

The leaves constitute the tea we use; the best time to gather them is whilst they

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are small, young, and juicy; they are plucked carefully one by one; and, notwithstanding the tediousness of this operation, the labourers are able to gather from four to fifteen pounds each in one day. The buildings, or drying houses, that are erected for curing tea, contain from five to twenty small furnaces, each having at the top a large flat iron-pan. There is also a long low table, covered with mats, on which the leaves are laid, and rolled by workmen, who sit round it; the iron-pan being heated to a certain degree, by a little fire made in the furnace underneath, a few pounds of the fresh gathered leaves are put upon the pan; the fresh and juicy leaves crack when they touch the pan, and it is the business of the operator to shift them as quick as possible with his bare hands, till they become too hot to be endured. At this instant he takes off the leaves with a kind of shovel, and pours them on the mats before the rollers, who, taking small quantities at a time, roll them

in the palms of their hands in one direction, while others are fanning them, that they may cool the more speedily, and retain their curl the longer. This process is repeated two or three times, or oftener, before the tea is put into the stores, in order that all the moisture of the leaves may be thoroughly dissipated, and their curl more completely preserved. On every repetition the pan is less heated, and the operation performed more slowly and cautiously; the tea is then separated into the different kinds, and deposited in the store for domestic use or exportation. The Chinese drink tea more frequently than the Europeans; it is the chief treat, with which they regale their friends; and it is said, that it is a branch of polite education in that country, to learn to infuse and serve it gracefully. It was introduced into Europe, very early in the last century by the Dutch East-India company. About the year 1666, a quantity of it was imported from Holland, by Lord Arlington, and  
Lord

Lord Offory, at which time it was sold for sixty shillings a pound. The present consumption of it is immense, nineteen millions of pounds being annually imported since the commutation act took place.

SOPHIA.

I think this agreeable beverage is reckoned unwholesome.

CECILIA.

The faculty reckon it very much so, to some constitutions, particularly low nervous habits; at the same time, they allow that the same quantity of warm water might be nearly as prejudicial; therefore I am willing to drink it cool, provided I may be permitted to enjoy this enlivening repast, which always seems superior in sociability and cheerfulness to every other meal in the day.

MR. HARCOURT.

At the same time that you mention its pernicious qualities, it is but fair to remark, that it is in some cases valued as a medicine;



cine, and is acknowledged to be the most powerful restorative to the spirits after fatigue of body or mind.

MRS. HARCOURT.

The general use of it among the poor and laborious part of mankind, I consider baneful to them in many respects : it consumes a large part of their scanty earnings, that might be expended in more nutritious food, and though it gives a temporary animation to their wearied spirits, it is not capable of renewing their strength, exhausted by the fatigues of the day; the same money laid out in milk would be more beneficial and nourishing to themselves and their infants; not that I would wholly deprive them of this solace, but I believe it would redound to their advantage, if it were only used occasionally by way of treat.

CECILIA.

I have no addition to make to my account; therefore I hope Charles is ready to begin.

CHARLES,

## CHARLES.

The cacao, or chocolate-nut, is a native of South-America, and is said to have been originally conveyed to Hispaniola from some of the provinces of New Spain, where it was not only used as an article of nourishment by the natives, but likewise served the purpose of money, being employed as a medium in barter; one hundred and fifty of the nuts were considered as nearly equivalent to a ryal by the Spaniards. It is a genus of the polyadelphia pentandria class; the flower has five petals, and five erect stamina; in the centre is placed the oval germen, which afterwards becomes an oblong pod, ending in a point, which is divided into five cells, filled with oval, compressed, fleshy seeds. The cacao-tree, both in size and shape, has some resemblance to a young black-heart cherry-tree. The flower is of a saffron colour, extremely beautiful, and the pods, which, when green, are much like a cucumber, proceed immediately

mediately from all parts of the body, and larger branches. Each pod may contain from twenty to thirty nuts or kernels, not unlike almonds. These nuts are first dried in the sun, and then packed for market, and after the parchment shell, in which they are involved, is removed, they require but little preparation to be made into good chocolate.

HENRY.

You are not to be let off so easily, Charles, you must give us an account of the process.

CHARLES.

The Spaniards were the first that introduced the use of chocolate into Europe. The method of preparing it, first practised by them, was very simple, and the same with that in use among the Indians; they only used cacao, maize, and raw sugar, as expressed from the canes, with a little achiote, or roco, to give it a colour: of these four drugs, ground between two stones,

stones, and mixed together in a certain proportion, they made a kind of bread, which served them equally for solid food, and for drink; eating it when hungry, and steeping it in hot water when thirsty. The Spaniards have since added many ingredients in the composition of their chocolate, which are thought to add but little to its quality. In England, the chocolate is simply ground with but little other addition than sugar and vanilla, which is the fruit of a plant cultivated in South-America. These ingredients together are made up into such cakes, as we see in the grocers' shops; when purchased for domestic use, it requires to be boiled in water, milk, or water-gruel, when sufficiently boiled, it is milled or agitated with a wooden machine for the purpose, and boiled again in order to froth it, then mixed with sugar and cream; it forms a favourite breakfast at the tables of the opulent, and serves to gratify their taste for variety.

Mr.

MR. HARCOURT.

Your account has hitherto been very entertaining; but I hope you can furnish us with the manner in which this beautiful and useful tree is cultivated, as I have been told that there are few vegetables that require more care to rear and bring to maturity.

CHARLES.

The first business of the planter is to chuse a suitable spot for the purpose. A deep black mould is the soil best adapted to the growth of the chocolate-tree; it should be a level piece of land, sheltered round with a thick wood, so as to be well screened from the wind, especially the north; after having cleared it from all manner of stumps and weeds, the planter digs a number of holes at eighteen or twenty feet distance. Having previously selected the largest and fairest pods of the cacao, when full ripe, he takes out the grains, and puts them into a vessel of water; such of them as swim he rejects, the others, being



being washed clean from the pulp, and skinned, are suffered to remain in the water, till they begin to sprout, when they are fit for planting. His next work is to take the leaves of the banana, or some other large leaf, one of which he places in the circumference of each hole, so as to line it within side; leaving the sides of the leaf some inches above the ground, after which he rubs the mould in very lightly, till the hole is filled; three nuts are then chosen for each hole, and planted triangularly, by making a small opening for each with his finger about two inches deep, into which he puts the nuts with that end downwards, from which the sprout issues, and having lightly covered them with mould, he folds the edges of the leaf over them, and places a small stone on the top to prevent it's opening. In the space of about eight or ten days, the young shoots begin to make their appearance above the earth, and call once more for the attendance of the planter, who

unfolds the banana leaves, that the growth of the tender plant may not be impeded; in order to shelter them from the sun, other leaves or branches are placed round the hole, and they are changed as often as they decay during five or six months. Such tender care does the cacao require, and so requisite is shade to its growth and prosperity, that, besides the precautions I have mentioned, they are obliged to plant some other tree to the south-west of the plant, which may grow up with it, and serve it for shelter against the scorching rays of the sun; the erythina, or bean-tree, is generally chosen for this purpose. In the fifth year it begins to repay the cultivator for his trouble, and by the time it has stood eight years, attains its full perfection. It generally produces two crops of fruit in the year, and will sometimes continue bearing for twenty years. The same delicacy of stamina, which characterises its infancy, is apparent in all the stages of its growth;

for

for it is obnoxious to blights, and shrinks from the first appearance of drought, and the greatest part of a whole crop of cacao-trees have been known to perish in a single night without any visible cause.

## AUGUSTA.

I am surprised that any person has the patience and perseverance to cultivate a shrub, that requires so much pains, and after all, so liable to disappoint the hopes of those, who have reared it at the expence of such a great deal of time and labour.

## MRS. HARCOURT.

I imagine that the profit it brings, when it succeeds, is the inducement to the attempt; nothing is to be effected without pains and labour; we cannot learn the simplest mechanical operation without repeated efforts; consider what numberless attempts an infant makes to walk or speak, before it can either articulate a perfect sound, or proceed a few steps by itself. In the same manner, the habit of performing most of

the common operations of the body, which we practise, as it were insensibly, when we have arrived at maturity, are acquired by almost imperceptible degrees: a child learns to judge of the distances of objects by experience, as of the distance and nature of sounds. The powers of smelling, tasting, feeling, hearing, and seeing exist in a new born infant, though a considerable space of time passes, before it is capable of reaping much benefit from them; repeated and continual practise, at length enables it to see, hear, taste, feel, and smell with accuracy and precision, if it be born with perfect organs. This should teach us never to despair of attaining any degree of perfection in virtue or knowledge, of which our nature is capable. If indolence, pride, avarice, or anger, are the leading propensities of a man's disposition, let him war with determined resolution, and unremitting care against that particular vice, to which he feels himself prone, and he will certainly

certainly come off victorious in the combat; resistance against a predominant inclination is at first painful, by repetition it is rendered easy, and in time the practice of the opposite virtue becomes delightful.

MR. HARCOURT.

The possibility of overcoming vicious inclinations, and correcting, what is commonly called our nature, is finely exemplified in the story of Socrates, and the physiognomist. A man, who pretended to discover the characteristic marks of the disposition and affections by the lines of the face, was introduced to Socrates, without knowing the philosopher, and desired to declare, by the rules of his art, what kind of person Socrates was. He replied, after observing his countenance attentively, that he was a drunkard, and a glutton, passionate, and a slave to vice in general. Upon which the company ridiculed his want of discernment, and denied all dependence on the truth of physiognomy; but Socrates

O 3

reproved



reproved their rashness, acknowledging that in his youth he felt himself powerfully inclined to these vices the man had named, but that perseverance and resolution had enabled him to overcome them, and all present knew that he had attained such command over himself as to be celebrated as a model of virtue and morality. My dear Henry must lay aside his intention of entertaining us with the history of coffee, till to-morrow evening. It is too late to begin a fresh subject. Adieu. Adieu.

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## CONVERSATION XVII.

MRS. HARCOURT.

I HAVE not forgotten that little Henry is to open the conversation to night, with an account of the peculiarities of the coffee-tree. Pray try to repeat the botanical definition properly; speak clearly, and distinctly,

distinctly, and arrange your ideas in order; if your memory should fail, your father or Sophia will assist you with pleasure, therefore be encouraged to proceed; we are all attention,

### HENRY.

After such kind encouragement from my dear mother, I have no excuse for declining the performance of my promise, though I feel myself scarcely equal to the task. The coffee-tree is a genus of the pentandria monogynia class; the flower has one petal, which is funnel shaped; it has five stamina, which are fastened to the tube, the roundish germen afterwards becomes an oval berry, containing two seeds, in shape like a half globe, flat on one side, and convex on the other. This tree originally came from Arabia Felix; but is now cultivated with success in the British West-Indies. It is a low tree, even in its native soil, seldom exceeding sixteen or eighteen feet high. In the West-India islands the negroes are employed

ployed to gather the berries; as soon as they change their colour to a dark red, they are fit for gathering. Each negro is provided with a canvass bag, with a hoop in the mouth of it, to keep it open; it is hung about the neck of the picker, who occasionally empties it into a basket; and if he be industrious, he may pick three bushels in the day. One hundred bushels in the pulp, fresh from the tree, will produce about one thousand pounds weight of merchantable coffee.

#### MR. HARCOURT.

You have given us a very clear account of this tree, and the manner of gathering the berries; you must next inform us of the method used in the drying them.

#### HENRY.

There are two methods in use of curing or drying the bean. The one is to spread the fresh coffee in the sun, in layers about five inches deep on a sloping terrace, or platform of boards, with the pulp on the berry,

berry, which in a few days ferments, and discharges itself in a strong acidulous moisture; and in this state the coffee is left, till it is perfectly dry, which, if the weather is favourable, it will be in about three weeks. The husks are afterwards separated from the seeds by a grinding mill, or frequently by pounding them with pestles in troughs, or large wooden mortars. The other mode is to pulp it immediately as it comes from the tree, which is done by a pulping-mill; the pulp and the bean (in its parchment skin or membrane which encloses it) fall promiscuously together; the whole is then washed in wire sieves, in order to separate the pulp from the seeds; the latter are then spread open in the sun to dry. After this follows the operation of grinding off the parchment skin, which covers the bean, and is left after the pulp is removed. When it appears sufficiently bruised, it is taken out of the trough, and put to the fan, which clears the coffee from the chaff, and the seeds remaining

maining unground, are separated by sieves, and returned to the mill, which finishes the process.

**MRS. HARCOURT.**

The coffee-berries are generally roasted before we use them. They are put into a tin cylindrical box, full of holes: through the middle of which runs a spit; beneath this machine is placed a semi-circular hearth, in which is lighted a large charcoal fire: by help of a jack the spit turns swiftly, and in that manner roasts the berries equally. When the oil rises, and is become of a dark brown colour, it is emptied into two receivers, the bottoms of which are iron-plates: then the coffee is shaken and left, till almost cold; and if it looks bright and oily, it is a sign it is well done. Sophia, you are doubtless acquainted with the manner of boiling it for use.

**SOPHIA.**

Take a sufficient quantity of the berries for the present purpose, and grind them to  
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a fine powder in an iron coffee-mill. Infuse this powder in a suitable proportion of boiling water, let this infusion just boil again, and stand till it is clear, and pour it off for use; the addition of cream and sugar heightens and improves the flavour.

**CECILIA.**

The Turks are remarkably fond of coffee; they flavour it with cloves, or essence of ambergris; and so essential do they deem it to their comfort, that it is one of the necessaries, with which a Turk is obliged to furnish his wife.

**MR. HARCOURT.**

Avarice has invented many substitutes for coffee; peas, beans, rye, and barley, when roasted, yield an oily matter, resembling it in a degree, but much inferior in strength and flavour.

**AUGUSTA.**

Many other things are sent to this country from the West-Indies, besides sugar, coffee, and chocolate.

**CHARLES.**

CHARLES.

Ginger is produced there in abundance: there are three species; the first, which is the common ginger, is cultivated for sale in most of the islands in America; but is a native of the East-Indies, and also of some parts of the West-Indies, where it is found growing naturally without culture. The dried roots of this sort furnish a considerable export from the British colonies in America. The only distinction between the black and the white ginger consists in the different modes of curing the roots. The black is rendered fit for preservation by means of boiling water, and the white by exposing it to the sun; as it is necessary to select the fairest and soundest roots for this purpose, white ginger is commonly one third dearer than black in the market.

MR. HARCOURT.

This root is planted much in the same manner as potatoes in Great Britain; but is only fit for digging once a year, unless for the

the purpose of preserving it in syrup. In that case it must be taken up at the end of three or four months, while its fibres are tender and full of sap.

HENRY.

Preserved ginger is a nice sweetmeat, I remember we had some of it at the entertainment given on account of Sophia's birth-day.

MRS. HARCOURT.

Most of the preserves, that come from the West-Indies, are excellent, owing to the fineness of the sugar, of which they make the syrup, which, whilst it prevents the fruit from decaying, does not destroy its flavour, or colour.

CHARLES.

What are the principal commodities returned from England to the West-Indies, in exchange for the things we receive from thence?

MR. HARCOURT.

The manufacturers of Birmingham and  
VOL. II. P Manchester,

Manchester; the clothiers of Yorkshire, Gloucestershire, and Wilts; the potters of Staffordshire; the proprietors of all the lead, copper and iron works have a greater vent in the British West-Indies for their respective commodities than they themselves perhaps conceive to be possible. The export of the coarser woollens to the torrid zone, for the use of the negroes, is prodigious; even sugar itself, the great staple of the West-Indies, is frequently returned them in a refined state, and thus furnishes an article of commerce in a double way.

MRS. HARCOURT.

Commerce and traffic, either between nations or individuals, may be divided into two great articles, under one of which all the rest may be classed, viz, the raw material, or natural substances, before they are changed or transformed by the inventions of art, such as corn, wool, iron, &c, and the various productions of nature, wrought and altered into innumerable compositions, by the

the industry and ingenuity of man. The globe, which we inhabit, may be compared to a vast storehouse, where an infinite variety of raw materials are laid up ready for the exercise of invention and diligence. Few things in their natural state are adapted to our use, though scarcely the meanest is void of utility, when compounded with other substances, or transformed by the action of fire, or changed by chemical processes, or wrought by manual labour: a convincing proof that a life of sloth and inactivity is not suited to our nature, and that no rank, however exalted, is exempt from labour. The vegetable, mineral, and animal kingdoms equally contribute to furnish matter for us to work upon. You may remember that the clear, transparent, beautiful ware, we call glass, is formed only of sand and ashes; and you will be presently informed that the elegant manufacture of porcelain, or China-ware is composed of stones. Sophia, pleased with the account



of tea, coffee, and chocolate, thought the tea-equipage would be completed, by the description of the process used in making China, and in consequence, has desired me to furnish her with information on the subject, that she might be enabled to amuse you with the result.

#### AUGUSTA.

Stones! how is it possible to produce any thing so smooth, glossy, and delicate as China from them? and I am still more at a loss to conjecture how they can be formed into such variety of shapes and figures, or by what means they can be united into such large flat surfaces, as dishes, bowls, &c.

#### SOPHIA.

By first grinding them to a very fine powder, and afterwards making them into a smooth paste.

#### HENRY.

Paste is soft and yielding, and will not retain its shape when handled.

#### SOPHIA.

**SOPHIA.**

It must be hardened by fire, before it is in a condition for use.

**CHARLES.**

I have read that the Chinese, the inventors of this curious art, are extremely secret, and so jealous of the eye of strangers, that they will not allow the Europeans to go beyond the suburbs of those cities, where factories are established, lest they should discover the mysteries of their different manufactures.

**MR. HARCOURT.**

That is a just representation of them. They are equally unwilling to communicate knowledge or receive instruction, and if we except the traffic carried on with the different nations of Europe at Canton, they have scarcely any intercourse with the rest of the world. Missionaries from the society of Jesuits have indeed been admitted even into Peking, their capital city, on account of their skill in astronomical

knowledge, which recommended them to the notice of the Chinese emperors and grandees, though the object of their journey was the propagation of christianity. Most of them, being men of intelligence and learning, have bestowed attention on whatever they saw, that was curious or useful, and some of them have been enabled to transmit their observations to Europe; from this source, the most authentic information on the manufacture of porcelain has been obtained, and was sent to the Grand Duke of Tuscany. But Sophia, I do not intend to intrude upon your province, we expect our information from you.

#### SOPHIA.

It will give me great pleasure, if I am capable of affording any entertainment. The art of making porcelain is one of those in which the oriental nations have excelled the Europeans; it is chiefly manufactured in China, from whence it takes its name,  
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but it is also brought into Europe, from other parts of the East, particularly Japan, Siam, Surat, and Persia. Neither the inventor, or the period of its invention is known, the Chinese annals being silent on the subject.

MR. HARCOURT.

Although we must acknowledge that the Orientals are superior to us in this art, yet Europe has established manufactures for several years, that have produced wares but little inferior to those of our eastern masters. The first European porcelains are said to have been made in Saxony. France followed her example, then England, afterwards Germany and Italy. Each of these manufactures differed from those of Japan and China, and respectively possess a distinct character of its own.

MRS. HARCOURT.

Connoisseurs in porcelain have valued some of the produce of the manufacture of Meissen, a few miles from Dresden, the capital

pital of Saxony, at even a higher rate than those of China: on account of the superior excellence of the painting and enamelling. The Saxons attribute the invention to an alchymist, named Betticher, who was confined in the castle of Koningstein, by the king of Poland, on a suspicion that he was master of the secret of the philosopher's stone, which was supposed by credulous persons, to possess the power of converting all metals into gold. Unable, with all his efforts, to obtain the object of his researches, he employed his leisure in more useful experiments, and discovered the means of making a ware, which by its excellence and value, continues to enrich his country. His death happened in the year 1719. Among the French porcelains, that of the late king's manufactory at Sevres is the most esteemed. The Chelsea China is but little inferior to those of Saxony and France, but being expensive, and adapted chiefly to ornamental purposes, is of no very general



neral advantage. Of the other manufactories established in this country, that of Worcester is best suited to common use, as it wears well, and comes cheap. Sophia has acquainted herself with the materials, and manner of manufacturing this commodity in the porcelain works in China, which will be sufficient to give us a general idea of the subject, without entering into the particulars of the manufactures of Europe, they being all formed upon one principle, however they may vary in minute differences.

SOPHIA.

M. Reaumur bestowed great pains in analysing the component parts of the Eastern China, and found that it consisted of two substances, one of which is easily vitrified, or converted into glass, the other possessing a contrary quality; the combination of those opposite materials, produces porcelain, which is a half vitrified substance, or manufacture, in a middle state,  
between

between the common baked earthen ware of our coarse manufactures and true glass. This composition makes a very curious article in commerce, and not less so in natural history. In order to proceed with method, I shall consider four things; the materials, that compose it; the art of giving the proper figure and shape to the different works; the colours, with which it is painted, gilded, and enamelled; and lastly, the baking, or exposing it to the proper degree of fire. There are two kinds of earths, and as many different oils, or varnishes, used in the composition of porcelain. The first earth, called kaolin, is intermixed with glittering corpuscles; the second, named petunse, is plain white, but exceedingly fine. They are both found in quarries twenty or thirty leagues from Kingteching, the name of the town, where the most considerable China-works are carried on, and to this place, these earths, or rather stones, are brought in a number of little barks, incessantly

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cellantly passing up and down the river  
laotcheou for that purpose. The petunses  
are cut from the quarries in form of bricks,  
being naturally pieces of a very hard rock;  
those are mostly valued, of which the co-  
lour inclines to a greenish hue. The first  
preparation of these bricks is to break and  
pound them, till they are rendered impal-  
pable, or as fine as can be conceived. This  
powder is thrown into an urn, full of  
water, and stirred briskly about with an  
iron instrument. After letting it stand still  
a while, the lighter parts of the powder  
form a skim on the surface of the water se-  
veral inches thick, which the workmen  
carefully skim off into another vessel filled  
with water, leaving the heavier sediment  
at the bottom to be reground. The second  
vessel is left to settle, and when it has stood  
long enough, they pour off the clear water,  
and reserve the matter, which subsides, for  
use: when it is nearly dry, it is cut into  
square pieces, and afterwards mixed with  
kaolin

kaolin in proper proportion. The kaolin is much softer than the petunse, when dug out of the quarry ; yet this is the ingredient, which, by its mixture with the other, gives strength and firmness to the work. The mountains, whence the kaolin is dug, are covered on the outside surface with a reddish earth. The mines are deep, and the matter is found in glebes or clods. They prepare both these stones in a similar manner.

#### CHARLES.

Pottery in general is made of clays or argillaceous earths, because they are capable of being kneaded, and easily receive any form, and acquire solidity and hardness, by exposure to the fire ; but I observe that porcelain is formed of the hardest rocks, reduced to an artificial clay or paste, by grinding them fine, and softening them with liquids.

#### SOPHIA.

The oils, that are added, soften them,  
I suppose,

I suppose, in a still greater degree, and render their texture smooth and uniform. The first oil or varnish is a whitish liquid substance, drawn from the hard stone, of which the petunses are formed; they choose the whitest squares, and those that have the most streaks of green in them for making the oil; they prepare the petunses for this purpose in the same manner as for making squares; when reduced to this state, it is mixed with a mineral stone, called shekau or kehao, resembling alum, which they first heat red hot, and then reduce into an impalpable powder; this gives the oil a consistence, but it should not be made too thick, as it is still to be kept in a liquid state. The fourth ingredient is the oil of lime, which requires a more tedious and difficult process. After dissolving large pieces of quick lime, and reducing them to a powder, by sprinkling water on them, they put a layer of dry fern on this powder, and on the fern, another of the slacked lime, and so on alternately, till they have heaped a moderate

VOL. II. Q pile,



pile, to which they set fire; when the whole is consumed, they compose another pile of layers of the ashes, and new layers of dry fern, which they burn as before; this operation is repeated five or six times, the oil being reckoned better, the oftener the ashes are burned. A quantity of these ashes of fern and lime is thrown into an urn filled with water, and to one hundred pounds of ashes, is added one pound of shekau, which dissolves in it; the rest of the process is the same as in preparing the earth of the petunses: the sediment found at the bottom of the second urn, kept in a liquid state, is called the oil of lime, from which the porcelain derives its principal lustre.

### CECILIA.

I am not surprised at the superiority of porcelain to common earthen ware, now I am acquainted with the various processes, used to render the materials suitable to the elegant purpose, for which they are designed.

MRS.

## MRS. HARCOURT.

As you have described the materials of this manufacture, and the manner of preparing them for their several uses, we must be contented to reserve the account of the various methods of forming them into vessels, figures, &c. till a future opportunity, as a particular engagement obliges me to leave you, rather earlier than usual this evening.

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CONVER.

## CONVERSATION XVIII.

## AUGUSTA.

**M**Y father has promised to take me to-morrow, to see a gentleman's museum, which is filled with rarities, and valuable curiosities; among other things, he tells me that there are several philosophical instruments, and that I am to see a variety of experiments. I should anticipate a great deal of pleasure in this visit, were I not entirely ignorant of the subjects with which I am to be entertained; so many things arise in my mind, which I wish to enquire about, lest I should expose my ignorance before strangers, that I find it difficult to select the questions most necessary to ask.

## MRS. HARCOURT.

A consciousness of our defects is the first step towards improvement; a young lady of your age is not expected to be deeply skilled

skilled in philosophy; much less to display her knowledge, should she possess a small share; but a general acquaintance with the uses of the most common philosophical instruments is not only an ornamental, but also a very useful accomplishment, and should form part of every liberal education.

### AUGUSTA.

My father mentioned several particulars, that are to be shewn me; telescopes, microscopes, and an orrery especially; but I am quite unacquainted with the purposes to which any of them are applied.

### MR. HARCOURT.

In order to prepare your mind for your intended visit, we will defer our conclusion of the porcelain manufacture till our next meeting, and endeavour to explain the uses, to which some of the most common philosophical instruments are applied. To enter into a description of their construction, or an explanation of their parts, would be uninteresting and tedious, unless we had the

machines before us. We will begin with the telescope, as presenting the most conspicuous, important, and noble objects in nature. It is an optical instrument, consisting of several glasses or lenses, fitted into a tube, through which remote objects are viewed as if near. Before the invention of the telescope, the wonders of the heavens were concealed from us beyond the powers of the naked eye; and astronomy, that exalted science, which illustrates the Omnipotence of the Divine Creator of the universe more eminently than any other branch of human knowledge, has been improved, and brought, by this simple instrument, to a degree of perfection unthought of, in former ages. The discovery was owing to chance rather than reflection, as it is certain, that the theory, upon which it depends, was not known when the first telescopes were made. Several claimed the honour of the invention; but Galileo, in the beginning of the seventeenth century, having



having been told of a certain optic glass made in Holland, which brought distant objects nearer to the eye, considered by what means this effect could be produced, and grinding two pieces of glass into form as well as he could, fitted them to the ends of an organ pipe, and with this indifferent apparatus shewed at once the novelty and wonder of the invention to the Venetian noblesse, on the top of the tower of St. Mark. From this time Galileo devoted himself wholly to the improving and perfecting of the telescope, and by his perseverance deserved the honour, usually attributed to him, of being the inventor of the instrument, and of its receiving the denomination of Galileo's tube, from his name. The Doge of Venice rewarded his assiduity with the ducal letters, and doubled his salary.

MRS. HARCOURT.

The extraordinary talents of this great man improved the first invention of the telescope

lescope to a vast degree of perfection; but it has been reserved for the period, in which we live, to advance the magnifying powers to a height at once truly astonishing. Our cotemporary, Dr. Herschel has made surprising progress in celestial geography, if I may be allowed the expression, by means of his Newtonian seven feet reflector, the most powerful instrument of the kind ever seen. It has enabled him to discover many stars before unknown, and curious particulars relative to those, with which we were previously acquainted.

#### CHARLES.

When the immense and inconceivable distances of the fixed stars are considered, it is wonderful to reflect that the inventive powers of such a diminutive animal, as man, have ever attained to such degrees of information on a subject apparently so far beyond his reach.

#### HENRY.

I do not think that the stars are so very far distant. On a clear night I have observed

but a little way above my head. I have tried several times to count them, but they are so numerous that I have always found it impossible.

CHARLES.

You are much deceived, my dear brother, in both respects. The stars, that are visible to the naked eye, are not so numerous as we are apt to suppose, from viewing them in a confused irregular manner; a thousand is supposed to be the greatest number ever seen in our hemisphere at one time, by the keenest eye, and most attentive observer. Their extreme distance conceals them from our sight, except they are unveiled by the assistance of telescopes, for they are really numerous beyond our limited imagination to conceive; and in order to give you a faint idea of their vast distance, I will relate a few observations, that I have heard upon the subject. Nothing, that we know, is so swift in its passage as light; a ray of light passes from the  
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sun to the earth in eight minutes and thirteen seconds, a distance of ninety-five millions, one hundred and twenty-three thousand miles; and yet, though possessing this amazing velocity, it would be one year and a quarter traversing the space between us and the nearest fixed star. A cannon ball, discharged from a twenty-four pounder with two thirds of its weight of powder, moves at about the rate of nineteen miles in a minute, but would be seven hundred and sixty thousand years passing from the nearest fixed star to our earth. Sound, which travels at the rate of nearly thirteen miles in a minute, would be one million, one hundred, and twenty thousand years passing through the same space.

CECILIA.

How far does the structure of the universe, viewed in this light, exceed the bounds of the strongest imagination! well might David express his sense of those wonders, by exclaiming, that the Heavens  
declare

declare the glory of God, and the firmament sheweth his handywork.

SOPHIA.

Addison remarks, that the universe is the work of infinite power, prompted by infinite goodness, having an infinite space to exert itself in, so that our imagination can set no limits to it.

MRS. HARCOURT.

The microscope is an instrument calculated to shew the other extreme of nature's works, by magnifying very minute objects, so as to render that clear to the sight, which from its minuteness, was before imperceptible. Dr. Hooke, who has written on the microscope, divides the objects proper to be viewed by it, into three classes, which he calls exceeding small bodies, exceeding small pores, and exceeding small motions. Small bodies must either be the parts of larger bodies, or things, the whole of which is too minute for our observation, unassisted by art; such as small seeds, insects, salts, sands,



sands, &c. Very small pores are the interstices between the solid parts of bodies, as in stones, timbers, minerals, shells, &c. or the mouths of minute vessels in vegetables, or the pores in the skin, bones, and other parts of animals. Extreme small motions are the movements of the several parts or members of minute animals, or the motion of the fluids, contained in either animal or vegetable bodies. Under one or other of these three heads, almost every thing around us affords matter of observation, and may conduce to our amusement and instruction.

#### AUGUSTA.

From what I have heard this evening, I expect to be highly entertained to-morrow, and hope, on some future day, you will favour me with more information on these subjects.

#### MR. HARCOURT.

It always affords me peculiar pleasure to communicate any thing to you, my dear children,

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children, that may enlarge and exalt your ideas of the great first Cause, from whom every thing proceeds, and by whom every thing is arranged and governed in the most perfect order; whether we reflect on the heavenly bodies, those stupendous instances of his omnipotence; or consider the insect imperceptible by its minuteness, yet perfect in all its parts, both internal and external, we are led equally to admire, and adore the same power, wisdom, and goodness, that are manifested in each extreme of his works.

MRS. HARCOURT.

The order of the universe is an inexhaustible theme of wonder and admiration to all, who consider it attentively; the wisest and most virtuous men of all ages have uniformly agreed in admiring the connection of its parts, and the correspondence of means to the end designed. Of what use would the eye have been, with all its curious mechanism, if there had been no light

to render objects visible? The more extensive our knowledge of nature, the more capable we are of tracing the wisdom and intelligence, that are visible in every part of the creation.

### CHARLES.

Notwithstanding the harmony of the works of Providence is so obvious to the most superficial observer, I have heard that there have been men so perversely stupid, as to suppose, that this beautiful world, with all its various inhabitants, as well as the other parts of the universe, were produced by mere chance, or the accidental assemblage of atoms, and have refused to acknowledge the existence of one Supreme Intelligent Being.

### MRS. HARCOURT.

If any man indeed ever doubted of that awful truth, he must have first bewildered his mind in useless and unprofitable speculations on metaphysical and abstruse subjects beyond our limited capacities to ex-

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### SOPHIA.

Let such an one observe the texture of the simplest blade of grass, the gauze wing of a common fly, without extending his researches to the œconomy of either the animal or vegetable world, and try if it can be imitated by the most exquisite specimens of art, he will find that it baffles every attempt, even in its external structure, but when he examines the internal organization, and uses of the parts, he must acknowledge it to be the work of a Divine Artist.

### MR. HARCOURT.

The various degrees of instinct in animals, and the intellectual powers in man, will be still more difficult to account for, as originating from any inferior cause, than that of an Infinitely Wise Almighty Being.

### MRS. HARCOURT.

Natural religion, or the belief of the

existence of a God, the Creator and Preserver of the Universe, for the manifestation of his power, wisdom, and goodness, is not confined to the globe, which we inhabit, but extends to the remotest point of created space, and is so congenial to our rational nature, that it is surprising that any one ever dared to acknowledge a doubt of it.

#### MR. HARCOURT.

The united testimony of all ages and nations concurs to render such men suspected of professing a belief which in the privacy of their own minds they deny, or of wilfully refusing to open their understandings to the convictions of truth. The most savage and ignorant tribes in every part of the globe, not only acknowledge the existence of a Supreme Cause, though they worship him under different names, and frequently mistake very absurd objects for his representatives; but also an universal belief of his divine influence upon the human



human mind; from this conviction arises the idea of prayer, a custom confined to no particular country, but the universal refuge of the human species in moments of distress and anguish; an assurance, that he graciously condescends to hear the petitions of his creatures, and benevolently relieves their affliction, must give encouragement to these applications.

## MRS. HARCOURT.

If we deprive mankind of this consoling hope, our present state is a deplorable one indeed; beset with temptations, surrounded by difficulties and trials, to what power could we flee for succour? Wretchedness with despair would be thy portion, O man! bereft of the consolation of natural religion, which not only teaches us to believe in the existence of an Almighty God, but also to adore his infinite perfections, to rely upon his goodness for preservation from the evils of the present

present life; and prepares us for the reception of the truths of revealed religion, by which are meant those manifestations, which have been revealed to man supernaturally by various means, but in a most especial manner by the coming of Jesus Christ, who was sent on earth to introduce a more pure and holy religion, than that given to the Jews, or any that had ever been contrived by human wisdom. He might properly be called the messenger of glad tidings, offering peace and immortality to all the human race without distinction, who should embrace his doctrine, and live according to his precepts.

MR. HARCOURT.

The perverseness of men's dispositions, and the limited faculties we possess, whilst in our present state, will ever raise cavillers against the most clear conviction; but let us shut our ears against their conversation, and our eyes against their writings; contenting ourselves with the study of the New Testament,

tament, and relying upon the assurances the Gospel offers; convinced that this line of conduct cannot injure us, but is likely to lead us to peace and happiness.

MRS. HARCOURT.

The period of man's life is too short to be wasted in speculative researches, which have no influence in correcting the disposition, or amending the heart. The path of duty is plain and obvious to every one, who sincerely endeavours to find it, and is equally adapted to the capacity of the unlettered hind, as to that of the learned philosopher. Each one has a part to perform, according to the circumstances in which he is placed; superior intelligence calls for superior excellence. A disposition to acknowledge the goodness of the Supreme Being towards all the parts of his creation, and thanksgiving for the peculiar blessings bestowed on each individual are incumbent duties on every rational creature. Let us unite in offering  
this

this incense with unfeigned gratitude, and conclude this conversation in the words of the poet :

Almighty Power, amazing are thy ways,  
Above our knowledge, and above our praise;  
How all thy works thy excellence display !  
How fair, how great, how wonderful are they !  
Thy hand yon wide extended heaven upraised,  
Yon wide extended heaven with stars emblazed,  
When each bright orb, since Time his course begun,  
Has roll'd a mighty world, or shined a sun.  
Stupenduous thought ! how sinks all human race,  
A point, an atom, in the field of space.  
Yet ev'n to us, O Lord, thy care extends,  
Thy bounty feeds us, and thy power defends.  
Yet ev'n to us, as delegate of thee,  
Thou giv'st dominion over land and sea.  
Whate'er or walks on earth, or flits in air,  
Whate'er of life the watery regions bear,  
All these are ours, and for th' extensive claim,  
We owe due homage to thy sacred name.  
Almighty Power, how wondrous are thy ways !  
How far above our knowledge and our praise !

END OF THE SECOND VOLUME,

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